TECHNOLOGY DEPT.

TECHNOLOGY

approach

NAVAER 00-75-510

January 1959

V. 4 #7

PUBLIC LIBRARY
JAN 8 1959
DETROIT

IN THIS ISSUE

- Halftime
- Consumers' Reports
- Tiger on the Loose
- Search Discontinued
- Liquid Lock
- . . . Request GCA

THE NAVAL AVIATION SAFETY REVIEW

ON THE COVER . . .

Whether your first January launch is in something like this A3D from the USS FORRESTAL, or in a T-34 from Pensacola, it can be a safer and more successful flight if you adhere to this month's safety theme —Standing Operating Procedures!

Vol. 4 | No. 7

approach

Letters 1
Halftime 3
"Request GCA" 6
Consumers' Reports 14
Anymouse 16
Headmouse 21
Wheels-Up Saves 23
Tiger on the Loose 24
Truth and Consequences 26
Notes from Your Flight Surgeon 29
Search Discontinued 32
Passing Through 12,000 36
From the Ground Up 39
Murphy's Law 47
Clipboard 48

Published by U.S. Naval Aviation Safety Center
NAS, Norfolk 11, Va.

RADM William O Burch, Jr.
Commander, Naval Aviation Safety Center

CDR Herman Evans, Jr.
Head, Literature Department

Editor, A. B. Young, Jr. **Managing Editor,** LCDR W. J. Thomas
Art Director, R. B. Trotter
Associate Editors: J. T. LeBarron, JOC; J. C. Kiriluk, Julia Bristow
Production: C. A. Coe, JO2, **Photographer:** J. E. Williams, Ph 1

Purposes and Policies: APPROACH is published monthly and contains the most accurate information currently available on the subject of aviation accident prevention. Contents should not be construed as regulations, orders, or directives. Material extracted from Aircraft Accident Reports, (OpNav 3750-1), Aircraft FLIGA Report (3750-10), Medical Officer's Reports (OpNav 3750-8) and Anymouse (anonymous) Reports may not be construed as incriminating under Art. 31, UCMJ. Photos: Official Navy or as credited.

Non-naval activities are requested to contact NASC prior to reprinting APPROACH material.

Correspondence: Contributions are welcome as are comments and criticisms. Views expressed in guest written articles are not necessarily those of the Naval Aviation Safety Center.

Printing: Printing of this publication approved by the Director of the Bureau of the Budget, 31 Dec. 1957.

Subscriptions: Single copy 30 cents; 1-year subscription $3.25; 75 cents additional for foreign mailing. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Library of Congress Catalog No. 57-60020.

Letters

We Stand Corrected

Sir:

With reference to your discussion of the O_2 troubles reported in "Cockpit Trouble" (Anymouse October 1958 APPROACH), under footnote 6 there is one error that I believe should be corrected.

You made the statement that, in the TV-2, you will always read the amount of oxygen in the system regardless of the position of the ON-OFF switch. This is not true if TV-2 ASC 117A is incorporated. Once this ASC is incorporated the ON-OFF valve is between the O_2 gage and the O_2 cylinder so that a ZERO gage reading will warn of a closed valve. In the event the valve is closed and the regulator is set to 100%, one breath should bleed the gage reading to ZERO. If the regulator is set to NORMAL several breaths will be necessary to bleed the gage reading to ZERO, but a definite drop will be reflected after each breath.

If all activities operating TV-2 aircraft will get "hot" and get this change incorporated it will at least remove one possible source of the pilot's reported difficulty.

T. B. RUSSELL, JR.
LCDR, USN
Maintenance Officer, VF-21

Professional Atmosphere

Sir:

Re: Letter, October '58, entitled "Atmosphere" and signed "Crusader."

Our hats are off to Crusader for his constructive approach to the problem as stated, " . . . Within this atmosphere, the generation of professional naval aviators that so many people dream of can be conceived."

CRUSADERS II
Kingsville, Texas

Sir:

My sincere thanks to CRUSADER for putting into clear, concise and very readable language a discussion of the basic ills of Naval Aviation. Fifty out of sixty pilots in this squadron join me in complete concurrence with the letter.

RICHARD P. EVANS
ASO VS-36

Slide Rule Offer

Sir:

I read the article on torque wrenches in the APPROACH magazine and feel that more of the same sort of information should be published. I'd appreciate your sending to me one of your Torque Wrench Adapter Slide Rules, and in turn I thank you for your concern and help in trying to get the one and only way to do things established and that is the right way.

DAN D. FRENCH, AMI
San Diego, Calif.

● APPROACH extends its thanks to P. A. Sturtevant & Co. of Addison, Ill., for forwarding Reader French's letter. It is typical of many received in response to their offer of free Slide Rules to those who ask for them.

Hi-Viz Paint

Sir:

. . . we have located an international orange high visibility temporary paint, Mil Spec. 6884A, which is now being put on VAP-62 aircraft; it's not fluorescent, and comes off fairly easily with mineral spirits, kerosene, etc. Don't know yet how it will wear, whether it will crack or fade with age, or how hard it will be to remove later on, but we're finding out and are making planes more visible while doing so . . .

W. P. JOHNSON
FAirJax

See reply to next letter.

Sir:

Re: an extremely high visibility orange paint developed by NRL . . . there a few aircraft using it, notably the Antarctic supply group. Compared to standard red-white paint, the orange stuff is shocking —it makes the old stuff look like camouflage!

CDR, USN

● BuAer Instruction NavAer 07.2A Sup-1, dated 2 Oct., 1958 prescribes painting of naval aircraft with high visibility fluorescent paint to aid in preventing midairs and requires immediate compliance.

The current program involves painting a large number of naval aircraft with a high visibility fluorescent finish to aid in minimizing the midair collision problem, as an anticipated improvement over the present requirements and high visibility scheme called out in Specification MIL-C-18263A (Aer)-1, Colors, exterior, Naval Aircraft; Requirements for, dated 30 July, 1957.

Two types of fluorescent paint have been developed. One is a solvent-removable type which provides ease of removal and reapplication without effect on the underlying finish, when the brightness drops to an unacceptable level; with the added advantage that it permits retention of the underlying camouflage color scheme on models which may be temporarily assigned to training use but which must

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U.S. Naval Aviation Safety Center.

Continued from preceding page

remain capable of deployment to combatant forces on short notice.

The other type is one which cannot be so readily removed but for which more experience exists as a result of service applications in the past on a variety of aircraft. The fading characteristics of the two types of paint under the same exposure conditions are essentially similar. Present plans call for application of the latter type by Overhaul and Repair Departments on aircraft undergoing overhaul and application of the solvent-removable type by operating activities or their supporting maintenance activity. Action on all combatant type aircraft (including camouflaged Marine aircraft), refueling aircraft, and helicopters is being deferred for the present, except in certain cases covered by separate specific Bureau of Aeronautics correspondence.

Sir Echo

Sir:

Since being introduced to APPROACH in 1955 I have awaited with anticipation each month's edition. The fine articles concerning various aspects of aviation safety have stimulated within many of us who are striving to become "PNAs" (Professional Naval Aviators) a conscious awareness of the importance of operating aircraft safely.

In your October 1958 issue I find still another example of outstanding ingenuity in your advertisement for "selling" the PSK-2 personal survival kit. Having utilized this kit in the field I can only echo your pitch, "Every aviator and crewman should carry one."

Here's "hats off" to Headmouse and all the Staff Mice for producing another fine inducement to further aviation safety in general and personal survival in particular.

B. R. STANDLEY
CAPT, USMC
Fleet Air Intelligence
Trng. Ctr., NorVa.

Squared Away

Sir:

In your October issue on page 45 you have an item on damage to an F9F-8 tail scag. We are of the opinion that the accompanying photograph is not the scag of an F9F-8. A "square" search of our assigned aircraft, (F9F-8, F8U-1, A4D-2, F4D-1, FJ-4, and SNB-5) has produced a negative result. We give up, what type of hook assembly, tail scag, access door, or sky hook is it?

W. H. ROZELL
ADC, USN
FAGU, El Centro, Calif.

● **Chief, your eagle eye caught us with our skags up. The photo is that of an FJ-3 — please see story and photo page 41.**

Want Word Too

Sir:

The November issue of APPROACH page 27 attempts to answer a question from a Pers. Equip. Off. on "Getting the Word." Your answer is very informative and a great assist to many people. Highly recommend two additional info addees: ComNavAirLant and ComNavAirPac, we appreciate the word too.

A READER

Vertigo Inducer

Sir:

Read your Headmouse's answer to the fallacious query concerning installation of rotating anti-collision lights in all Navy aircraft. (October APPROACH). "All Navy aircraft except jets" do not have rotating lights! I dare say the AD is not the only proof of that statement.

An important factor to be considered in addition to your valid reasons for non-incorporation of rotating anti-collision lights is that old nemesis—*vertigo!* Any pilot who flies night VFR formation (say nothing of IFR flight) close to a rotating light and doesn't suffer from vertigo or hypnosis is a rare specimen indeed.

UNRARE SPECIMEN
VA-195

Short and Sour

Sir:

November 1958 issue, Anymouse, page 23, "FAM JAM." Improper procedure by Asst. Flight Training Officer.

Ref: OpNav Instruction 3710.7A, Section VIII, Para. 1. 3., " . . . no propeller shall be fully feathered or engine stopped at an altitude below 6000 feet above the terrain."

No instruction is written without reason. Recommend: the AFTO who chopped the mixture and the Safety Officer who didn't properly review the squadron SOP do two laps around the hangar with the student chasing them. If he catches them - - - - -.

V. D. ROSE
Aviation Safety Officer
ComFAirAlameda

Alternate System

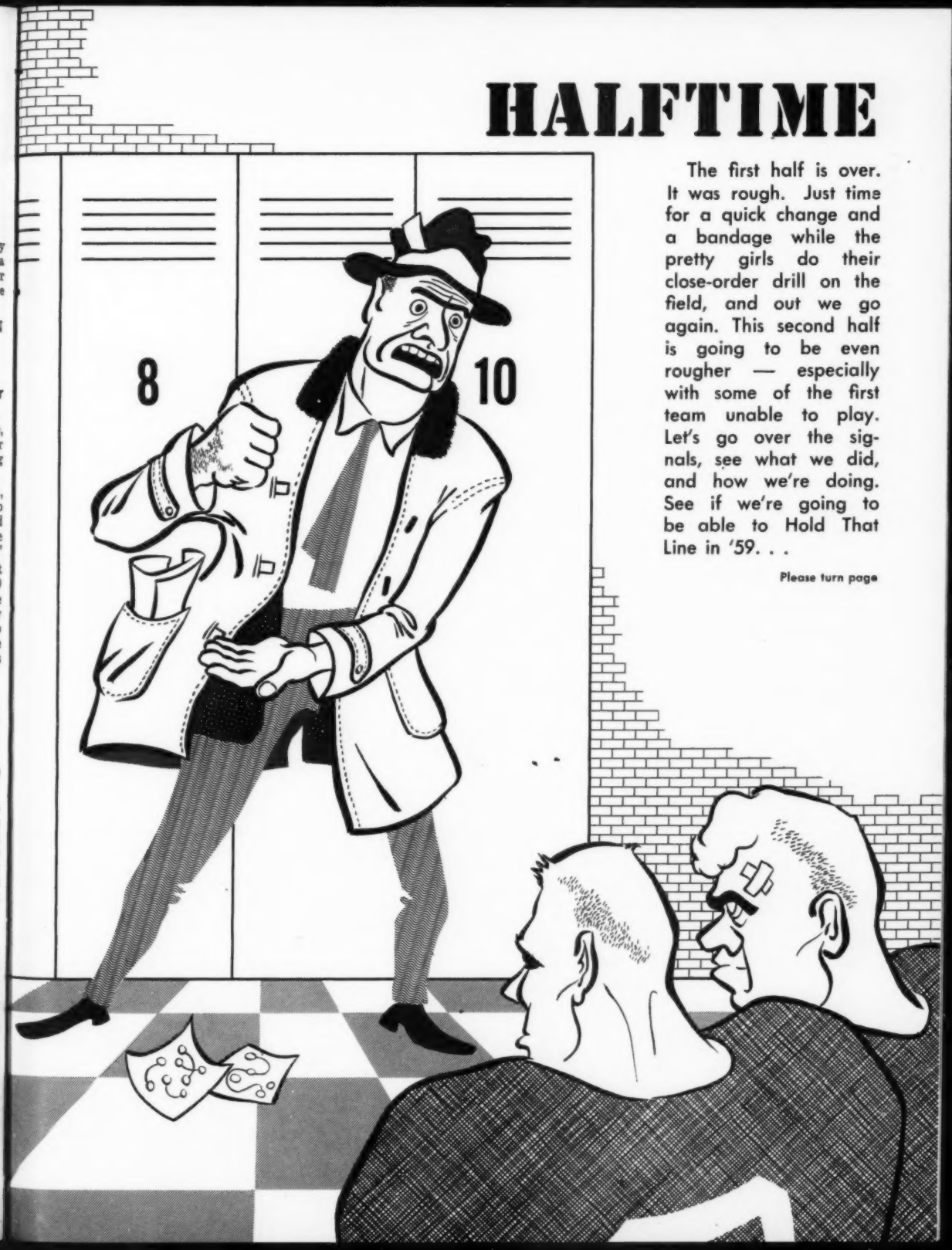
Sir:

The emergency fuel control system is there to be used. A change in the wording to alternate fuel control system may be a help to pilots that are reluctant to use the *emergency* system, but it will not help those that forget to shift over.

FLIGA WRITER

● **The insidiousness of language currently in use in aviation is well recognized. The 2nd Navy-Industry Conference jointly sponsored by BuAer and NASC (5-6 November 58) brought about a recommendation that more effort be directed by industry and government to standardization of terminology as well as reporting systems. Your suggestion is a step in this direction. For more on the subject of language difficulties please see "Tower of Babel," May 1958 APPROACH.**

HALFTIME



The first half is over. It was rough. Just time for a quick change and a bandage while the pretty girls do their close-order drill on the field, and out we go again. This second half is going to be even rougher — especially with some of the first team unable to play. Let's go over the signals, see what we did, and how we're doing. See if we're going to be able to Hold That Line in '59. . .

Please turn page

Continued from preceding page

Hold that line. Yeh boy, hold it and even push it back some. We started the game on 1 July, and before the day was over there were two major aircraft accidents. At the end of the week we had a bill for nearly 3½ million dollars, nine stricken aircraft and one fatality. One wheels-up landing, too.

And now, at half-time, 184 days later, here's how we stand. We estimate that we've ended the first half with a major accident rate of 2.8—that's 2.8 major accidents per 10,000 flight hours.

What's that, Kosnowski? Pretty good, you say? Oh sure, it's pretty good when you consider that we didn't wreck every airplane the Navy owns—yes, it could have been a lot worse.

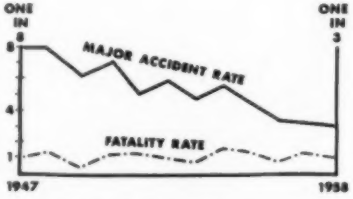
But, just as a barrel is half full and half empty at the same time, so Pretty Good is also Pretty Bad. Pretty Bad because it could have been better. There could have been fewer accidents, fewer lives lost forever, if everyone concerned with naval aviation had given just a little more emphasis to safety. The 51 fatalities in October could have been only 50, for example, if a certain pilot had done This instead of That, and it would have been 49 if a flight deck man had watched his pilot more closely. Two student pilots keeping an alert lookout in all directions could have reduced the figure to 47 . . . and so on.

The line and the backfield, and the subs on the bench . . . and even a coach or two, have contributed their share to the half-time score.

How are we doing compared to last year, anyone remember? At this point a year ago the all-Navy major accident rate was 2.9—and for this past half it's expected to be 2.8—are we doing better?

Not really, for when OpNav Instruction 3750.6C was made effective 1 July 1958, it contained some changes in ground rules and reporting procedures. This direct rate-for-rate comparison isn't quite valid; the 2.9 rate for the first half of FY 1958 would be approximately 2.4 under the current rules. If the accident rate stays the same as last year, we're losing ground and our own goal posts aren't far behind.

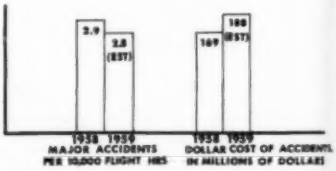
Disturbing is the fatality rate as it relates to accidents. Historically, the fatality rate has



While the major accident rate has declined, the rate of fatalities has remained fairly constant; chances are now that there will be one fatality for every three major accidents.

remained pretty much the same —right around 1.0 per 10,000 flight hours. But the accident rate has been steadily decreasing. Which means that if you are involved in a major accident, chances now are greater that it will be a fatal one.

Along with the Cost of Living, up goes the Cost of Buying Airplanes. The same airplane that cost X dollars in 1957 costs X-PLUS dollars now, so even if we flew the same number of hours and busted up the exact same number of airplanes as last year, our cost to replace them would be greater. For example, the dollar loss for the first half just completed is expected to be some 11% *greater* than that for the



For the first half of fiscal 1959, the rate of major accidents is expected to decrease a slight amount, but the dollar cost of major accidents is expected to swing upward.

equivalent fiscal 1958 period, even though the hours, major accidents and strikes are expected to be *less*.

As more new high-performance aircraft join the fleet, their percentage of the Navy's total accidents increases. They're less forgiving of error, delay, inattention or distraction. They're more expensive. And when they bust up, they do it more completely, for their high perform-

ance is based on design criteria which provides for *flying* right up to the limits of their flight envelope. The old biplanes that flew into the side of a wooden barn to thrill the public—they had strength to spare. But today's planes have to choose between barn-busting and mach busting—they can't have both. There's no extra strength left over for use as a battering ram.

It's estimated that our new stable of aircraft will experience about 50% more major accidents this fiscal year than they had in fiscal 1958; they're off to a Not Good start already, for by the first week in November they had already suffered half as many accidents as had occurred in the previous year. Those new aircraft, which fly only about 9% of the Navy's total flight time, account for about 30% of our major accidents. Aviation Safety Officers can provide more specific figures.

Halftime is an opportunity for serious, if limited, reflection on What To Do in the next half to sew up the game. Even the team that's two touchdowns ahead isn't sitting around complacently while the coach hands out bouquets—they're discussing what they did that kept them from being *four* touchdowns ahead. The other team—well, the coach isn't handing out any bouquets there either. He's pointing out how that last touchdown run got through the left tackle, what to do about it in the next half so he won't have to find a line of sporting goods to sell.

But it isn't always possible to discover trends, which are one of our most valuable tools in spotlighting problem areas in time to give them concentrated attention. For example, the HSS helicopter operated free of accidents for the five months preceding fiscal 1959, and then it started off '59 with eight major accidents during the first quarter, with no apparent cause factor trend. Out of 16 F4D accidents in the first quarter, 9 involved material failure, again with no identifiable trend.

One area in which there's always room for improvement, though, is the landing phase. Our newer high-performance aircraft are having a high percentage of their major accidents in this vital phase of flight. Concentrated attention to this area can have highly beneficial results, as shown by a force commander after designating October 1958 as Perfect Landing Month. A widespread campaign aimed at all levels was conceived and put into effect for some time prior to October. By the time October came, no pilot wanted to be The One who made an imperfect landing.

Commands seeking to attack problem areas need look no farther than the primary and alternate themes published in the Aviation Safety Officer's Guide. Like the remainder of the Guide, the themes are only a point of departure, commands experiencing local conditions should not feel bound by the chronology of the themes nor even by the themes themselves, but should direct their efforts toward the reduction or elimination of conditions known to be of high accident potential.

Okay men, the band and the pretty girls are marching off the field. Are you ready to go in and push the line back during the second half? It isn't enough just to hold the line, the ball is in our territory and we're on the defensive. If everyone is conscious of the effort necessary to reduce our accident rate, we can end the year with a victory. But more bonehead stunts like that tackle who let a ball carrier get by him, and we'll be picking our own goal post splinters out of each other.

If we're to come out ahead, every man on the team, the water boys and the cheerleaders, the trainers, mascot and the coach, the doc and the band, all need to realize that we're playing a deadly serious, permanent game whose score can't be changed by arguing with the ref. If you play the game with all you've got, and then just a little bit more, the score will take care of itself—we'll WIN!

They're out on the field already, so get out there you guys, and Give 'em Hell!

"...Request

s GCA"

"NOW passing through GCA minimums . . . the outside observer has you in sight . . . take over visually . . ."

At the end of a tiring flight, with the ceiling and visibility crowding you hard, those words from the GCA controller are the most cheerful in the dictionary. For simplicity the Ground Controlled Approach can't be beat; there's no extra instruments to scan or interpret, but, one feature makes it distinct from all other low approach systems. It is a double man-machine relationship: The pilot plus his aircraft and the controller plus his radar scope.

Considering this double man-machine relationship, an understanding of the controller's duties, his equipment, and some thought about the techniques involved may prove useful in future GCA runs.

Briefly the tools of the GCA controller are a search radar, precision radar (consisting of two units), and a communications system. The search radar has a 360-degree sweep with a maximum range of 36 to 50 miles. Present equipment is capable of picking up small aircraft at altitudes up to 8000 feet with normal antenna tilt.

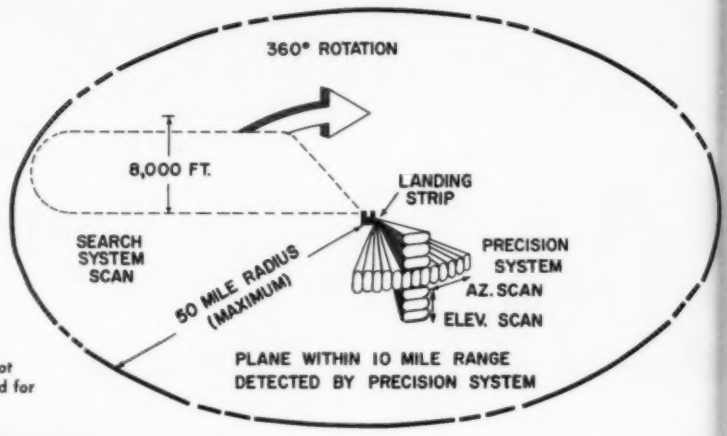
Precision radar has a range of 10 miles. The azimuth antenna, showing your relationship to the centerline of the duty runway, scans a 20-degree area. The elevation antenna, showing your position relative to the glide path, scans an area 7 degrees in elevation. Figure 1 (next page) shows the general layout and coverage of GCA.

Each of the radar systems has a separate scope as illustrated in figures 2 and 3. The search radar, in addition to locating and directing aircraft into position for a precision approach, is used for Air Surveillance Radar Approaches (ASR) whenever necessary.

The real heart of the Ground Controlled Approach system is the precision scope. Though the precision radar is actually two separate antennas, one sweeping up and down in elevation and the other from side to side in azimuth, the patterns of both are presented on one scope. Known as

Continued from preceding page

Fig. 1



Range of the search radar must be at least 36 miles and it has a maximum of about 50 miles. When precision radar is not available the search radar is used for ASR approaches.

Fig. 2

Scope presentation of Search system

Fig. 3

Scope presentation of Precision system

the "AZ-EL" scope, the glide path is on the upper half and the runway lineup is shown on the lower half.

Since the usual angle of landing descent of the aircraft is only 3 degrees or less, large deviations above or below this course could pass undetected and to overcome this the scope presentation is expanded and magnified. The up and down movement of the target on the glide slope is magnified 10 times and makes it possible to detect deviations of one-tenth degree. Greater deviations can be tolerated in azimuth than in elevation and the magnification is 6 times which is satisfactory.

When an aircraft is directed into the area covered by the precision radar the resulting "pip" of light on the AZ-EL scope resembles a slightly overgrown grain of rice. New pips are "painted" on the fluorescent-coated scope as the aircraft moves ahead and a fading smoky trail is left behind.

Usually the final controller has the opportunity to observe the aircraft on the search scope and can often get an idea of what the precision approach may be like. If an opinion can be gathered from GCA personnel (they don't talk about their customers) it is the pilot who is rusty in basic instrument flying techniques that has difficulty.

The final controller has some of the problems of a tight rope walker, as he tries to keep one pip of light centered on the glide path and another one on the centerline, but he is limited to oral directions, plus a little "body english," to get the aircraft into the right spot.

This is why controllers appreciate smooth and accurate instrument flying. For each instruction received by the pilot the radar equipment must first transmit and receive a pulse then paint a target. The controller then observes the change

e upper
e lower

t of the
viations
detected
ation is
n move-
agnified
viations
can be
and the
ry.
rea cov-
g "pip"
slightly
ainted"
aircraft
is left

rtunity
pe and
ion ap-
athered
ut their
n basic
ulty.
roblems
one pip
another
to oral
get the

oth and
ruction
t must
paint a
change

in scope presentation and establishes the *trend* so that he can *predict* the next move that the aircraft *should* make. Then this information is put into words and is received in the pilot's headset. Now, the pilot interprets what he hears and puts the information to work in the form of a human reaction in the cockpit.

By the time the pilot is squared away on this last change the radar target has already been painted several more times on the radar scope and unless the pilot is properly aligned or approaching the proper alignment it is already time for another change. A wandering flight path or non standard rate turn makes it harder for the controller to establish the trend.

Another subject close to the hearts of controllers is one concerning corrections of heading and glide path. They stress the necessity for the pilot to act on *all* corrections at the *time* they are given. If a small correction is ignored or delayed it is only a matter of seconds until a much larger correction is required, leading to the possibility of a porpoising flight path at the worst possible time.

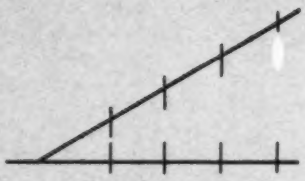
Of all elements of GCA, the glide slope is perhaps of greatest interest, but, before arriving at that point in the approach a word on altitude control should be offered. GCA final controller's scope does not give the precision indication of altitude at 5 to 6 miles that it does nearer the runway. At the longer ranges the altitude determination of a single-pilot jet can be considered accurate to approximately plus or minus 300 feet. Also, when you receive the field altimeter setting, crank it in; an error of only one-tenth of an inch in the setting can cause 100 feet difference in pattern altitude. There are accidents on file where the aircraft hit short of the runway with an incorrect setting.

The majority of the glide slopes in the U.S. are between 3 degrees and 2.5 degrees. Though several exceed 3 degrees none is shallower than 2.5. Usual altitude on final approach (a point beginning 7 miles from the field) is 1000 feet. A 3-degree glide slope intercepts this 1000-foot altitude at 3.2 miles from GCA touchdown point. The accompanying drawings show how the controller starts the aircraft down the glide path.

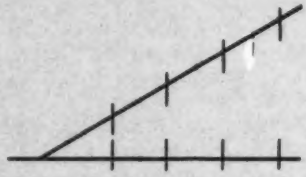
As the aircraft settles into its descent the controller can determine whether an adjustment is needed. "On glide path and holding" is the objective but corrections may be required. Fill-in transmissions attempt to present the pilot with a picture of what is occurring. For example if high and correcting you may hear one of these three phrases: "Above glide path and coming down rapidly; . . . coming down slowly; . . . coming down nicely."

After intercepting the glide path the controller

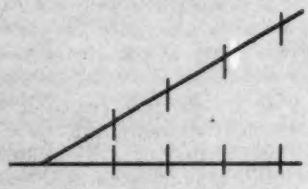
Interpreting The Glide Path



Altitude 1000 feet above the field. Maintaining heading to keep on centerline.



When the top of the pip touches the glide path the pilot is told "approaching the glide path . . . begin your rate of descent . . ."



Controller mentally divides pip into thirds. The top third is above the glide path and he says ". . . below glide path . . . coming up slowly . . ."

Having made adjustments to begin the descent, there is no need for concern about being below the glide path at this point. Inertia prevents the aircraft from instantly changing from level to descending flight path and the controller is simply reporting what he sees. His next words will be the reassuring "on glide path."

Continued from preceding page

transmits 75 percent glidepath information and 25 percent azimuth and ranges. Ranges on final approach are called at each mile, down to 3 miles from the field, and every ½ mile thereafter, including over end of runway and over touchdown.

How you commence a rate of descent after intercepting the glide slope seems to be a matter of training, experience and the type of aircraft being flown as several procedures appear to be in regular use. One system is to have the gear down, partial flaps extended, and to set up the descent by a reduction of power and further flap extension. The other is to fly the aircraft with gear up, flaps extended, reduced power, then when intercepting the glide slope the gear is dropped. (Using this last method has resulted in gear-up landings on GCA runs.—Ed.)

Airspeed during the initial approach is one which would normally be used on the downwind leg during a visual landing pattern. Gross weight will determine exact speed of course, but on final approach a rule-of-thumb is to calculate it on the basis of 130 percent of the stall speed in landing configuration. Main reason for using "percentage of stall" is that it presents a common ground for understanding and can be applied to the R7V as well as an A4D.

Practice GCA runs should be made at the airspeed which would be used in an actual GCA because when you really need GCA the weather will probably be such that runway conditions will adversely affect the landing roll. Tacking on extra knots during practice defeats the purpose of the practice. "The item that determines the magnitude of the problem of decelerating an airplane is of course the touchdown speed" says an NACA study; meaning, the extra knots which gave you a more solid feeling on the glide path turn out to be a nasty inconvenience when the runway is dead ahead and it's time to put the airplane on the ground.

The only indication the operator has of the target's position is its relation to the cursor lines (glide path and centerline). A missed approach will be ordered when the controller observes that a safe approach or landing is questionable. During the last one mile of the approach a rapid or radical deviation from the centerline is used as a guide for azimuth. A deviation of more than one-half degree from the glide path is used as a guide in elevation. From one-half mile to the end of the approach if the target is not touching the cursor lines a waveoff is ordered. Also, anytime the target goes rapidly below the glidepath the controller will call for a waveoff. The waveoff is mandatory *unless the field is in sight* and it then becomes advisory and up to the discretion of the pilot.

A rapid descent below the glidepath in the final stages of the approach is rather common according to controllers. It usually means the pilot has broken out VFR or feels he has the runway made and the rapid descent is intended to be a final correction to shoot for a closer touchdown than provided by the GCA touchdown point. At night or with precipitation blurring the windshield, the conservative view is to take advantage of the GCA glidepath for a few seconds after you become VFR.

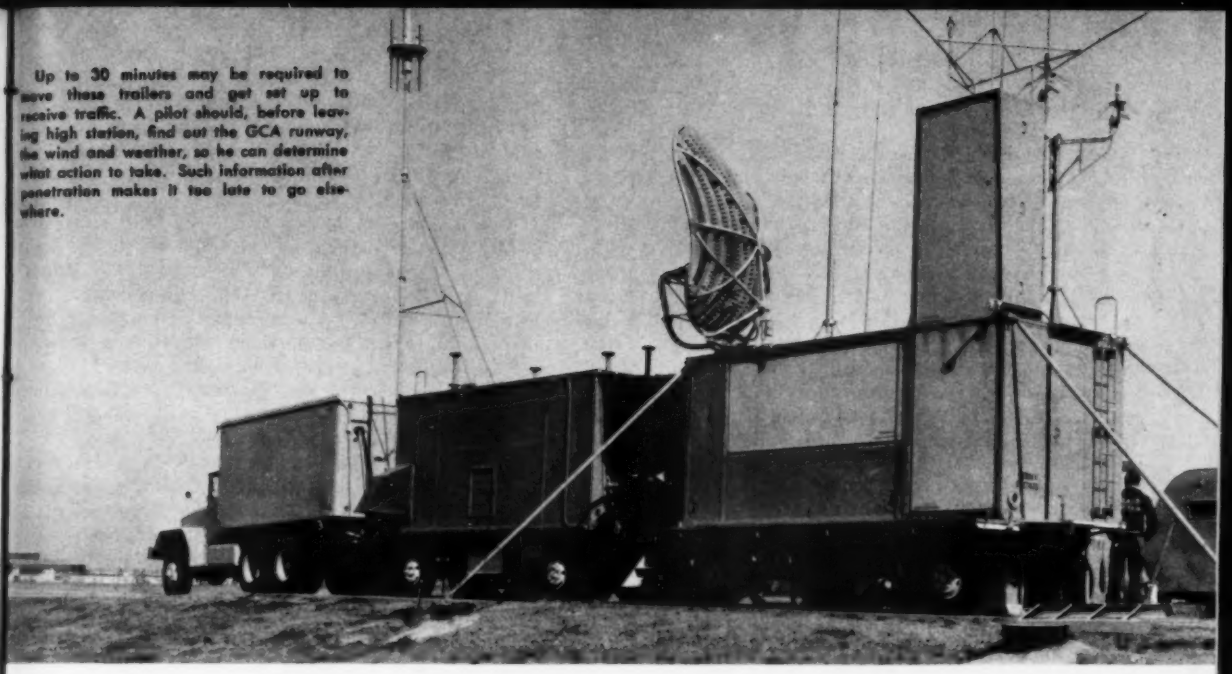
There are several reasons for this view. During darkness depth perception is reduced which directly affects a pilot's ability to measure height. GCA touchdown points range from 500 to 1000 feet from the end of the runway. Holding the rate of descent which kept you on the glide path aims the aircraft at the GCA touchdown point and provides insurance against undershoots.

Published GCA minimums are used together for convenience (100-¼, 250-½, etc.) but the ceiling and visibility minimums almost never coincide on the glide slope. Therefore, *two distinct minimums must be observed* on each run! It is the pilot's responsibility to *level off at ceiling minimums unless the runway is in sight*, and *when visibility minimums have been reached, a waveoff is mandatory* unless a visual approach can be made.

Once the aircraft has passed minimums the controller provides *advisory* information only. As long as the aircraft is within position limits, he will report the plane's position until the GCA touchdown point is passed.

With a crosswind the controller must apply enough drift correction to keep the target tracking directly into the runway centerline. According to controllers, this drift correction has caused pilots to mistakenly assume they were not lined up properly when breaking out VFR. This was caused when the pilot looked dead ahead through the windshield, but due to his drift correction, he saw the runway centerline or runway lights off to the side. Either the drift correction was abruptly removed with a turn to the runway heading, with drift commencing before touchdown, or a missed approach was made. Thus, say the controllers, don't be in too much of a hurry to change a heading which has brought you down the GCA centerline.

Standard technique for the GCA controller is to inform the pilot of his position relative to the runway centerline such as, "centerline of runway is slightly to your right (left or dead ahead)." Another item given the pilot is his apparent drift ("no apparent drift this heading") and some controllers transmit a reminder about the crosswind if time permits.



Up to 30 minutes may be required to move these trailers and get set up to receive traffic. A pilot should, before leaving high station, find out the GCA runway, the wind and weather, so he can determine what action to take. Such information after penetration makes it too late to go elsewhere.

With high winds GCA personnel attempt to make the GCA runway closest into the wind. However, there may be times when moving the equipment is delayed or not possible, even for a runway published as being available for GCA. Depending upon local conditions the normal time for shutting down, moving the trailers and resuming operations is 30 minutes. Some units can shift runways in as low as 12 minutes in ideal conditions but with ice, snow or rain the full 30 minutes, or more, may be needed.

High winds then, bring up the possibility of a crosswind. For example, you check in and get wind and weather from approach control. Say the wind is from the north at 25 knots, gusting to 35. In order to know if the crosswind exceeds aircraft capabilities, you should know to what runway the GCA run will be made. In case a landing could not be attempted on the GCA runway due to excess crosswind the ceiling and visibility must be reviewed. Are they at least surveillance minimums so you can prepare for, or request, an ASR to the best runway? Or perhaps you plan on breaking out VFR and making a circling approach. Circling minimums are usually even higher than surveillance minimums.

Besides a possible crosswind, match the GCA runway against the wind direction for a tailwind component. A lot of overruns have been gouged up by pilots who found out too late they were landing with a tailwind and couldn't stop on the runway. This is especially important, again when weather does not permit a circling approach to land against the wind. Strong winds also affect the rate of descent—a tailwind requiring an increased rate, and a headwind a reduced rate of descent.

During all radar operations one man of the GCA team is designated "visual observer" and though he is usually stationed at the approach end of the runway during IFR approaches, his location will actually depend on the availability of mobile radio equipment or interphone lines to the GCA trailer.

The visual, or "outside observer" as he is sometimes called, advises the GCA final controller by interphone or radio whenever he sights the aircraft. At this point in the approach the controller is increasingly occupied with final corrections and he uses a key phrase to notify the pilot that the aircraft is in visual contact. The controller transmits "Take over visually" only when the visual observer reports positive contact with the approaching aircraft. For pilots of single-place aircraft this can reduce the amount of head-bobbing glances through the windshield to see if the runway is in sight.

During daylight hours if the runway lights, and mirror lights (where available) are turned on, the pilot is aided in lineup and in gaining visual contact with the runway. Policy on lighting the runway during IFR weather will vary from station to station and as the lighting controls are in the tower it is easier to get such information from approach control during the initial contact.

As in everything else connected with a flight, preflight planning on GCA pays dividends. The request for GCA at destination should always be noted on the DD175, of course, and a check of

Continued from preceding page

NOTAMs should be a habit. But if your destination is other than a Navy field make one further check: See if Flight Service is carrying any NOTAMs concerning the destination and alternate. Most Naval Air Stations have only certain Air Force Bases on file.

Should the destination be changed while en route the conversation will likely be with CAA facilities. If GCA is desired at the new destination you should request that the ground radio pass the change and GCA request on to Flight Service. This is also the case in the event you divert to the alternate and want GCA "just in case."

Availability of GCA has at times caused difficulty for jets but this has been overcome for the most part with equipment modifications. Starting with power off, a 30-minute delay is considered normal before GCA can accept traffic. There are delay lines in the radar (12 minutes are required before even full operating current flows) which makes it impossible for GCA to burst into operation.

Faced with jets and their critical holding time, there was developed what is known as preheat condition. With preheat the equipment can be kept at the stage where a few switches are turned on and the crew is ready to accept traffic in a matter of several minutes.

One authoritative opinion is that in periods of rapidly changing weather, GCA should be maintained in a ready status as jets sometimes reach their destination before the flight plan is received, especially when short distances and times are involved. Any delay which is greater than the time required for a normal penetration time is not acceptable (if penetration requires 6 minutes, GCA should be able to report ready in 6 minutes, and so forth). GCA equipment with preheat meets this requirement.

Since 1957 the majority of Air Force GCA units have been able to provide IFF service to aircraft so equipped. The system has been evaluated by the Navy at Patuxent River and the necessary equipment to provide this capability for Navy GCA units is presently under procurement. Function of the system is to make positive identification quicker, eliminating in most cases, the series of "identifying turns." The pilot receiving IFF service operates his IFF as directed by the controller.

Sometime during your flying years you may hear the mention of "blind speeds" in connection with GCA. At first it sounds fearsome but it is brought up here only to dismiss it. Simply stated, the Moving Target Indicator (MTI) in the GCA equipment cancels out radar returns from stationary targets or ones with a zero rate of closure (as when an aircraft makes a circular track around the radar unit) and at certain speeds the aircraft will fade off the scope when heading toward or away from the GCA antenna.

The phenomena is not a new or startling discovery. It is old stuff to electronic engineers and may be to many aviators, but most important, blind speeds are recognized and compensated for by GCA operators. About the only time the equipment would be affected would be with a jet on an ASR final approach where the ground speed was between 153 and 159 knots. It has been found practical for the radar controller to ask the pilot to adjust his approach speed slightly.

There is no better way to introduce the subject of practice GCAs than with this incident. It concerns a late model jet on a practice-hooded GCA.

The pilot requested a low pass and the controller instructed him to level off at 200 feet. However the pilot continued descending and was given heading and altitude information by GCA until over touchdown point. The aircraft touched down on the runway slightly left of centerline with the pilot still hooded! The experience was marred unfortunately, when one tire blew and sent the aircraft off the side of the runway with subsequent damage to the aircraft.

This brings out one thing which GCA people stress: GCA is a low approach system, *not a zero-zero system*. Had it been suitable for *zero-zero* operations there would be no need for minimums. Other than this there are several other important omissions in the incident; pilot's failure to pop his hood and to level off; controller's failure to specifically advise the pilot to pop the hood at 500 feet. All of these pieces of advice are contained in OpNav Instruction 3721.1B which is the policy and operating instructions for GCA. All pilots should become familiar with this instruction but in the event you aren't, these points are of interest.

For single-piloted aircraft, pilots must have completed at least two visual GCAs *in model* prior to making a hooded approach. All pilots, regardless of aircraft, must have a minimum of three visual surveillance or precision approaches prior to making hooded approaches.

Pilots *must* obtain approval from the radar controller prior to *each* hooded approach. This is especially true for single-pilot aircraft. If the controller is not alerted he may assume the approach will be visual. In this case he is not required to clearly advise the pilot to take over visually when reaching 500 feet above the ground. Of course the pilot under the hood should automatically go visual by popping the hood even if not advised by the controller but as shown previously, this is sometimes forgotten while con-

After a practice GCA to a full stop, the aircraft went off the end of the runway on landing rollout. Runway conditions included water, a downslope gradient, and a headwind component of less than two knots. The touchdown speed was slightly higher than normal and braking was delayed.

centrating on instrument flying and maintaining heading and descent.

Traffic permitting, and as long as the aircraft is within position limits, the controller will continue to issue advisory instructions until the GCA touchdown point has been reached. Note again that a waveoff given by the controller is advisory if the pilot has the approach end of the runway in sight and elects to continue the approach visually.

So now the stage is set. Not aware that the pilot is hooded, the controller continues his talkdown. The pilot, concentrating on the instrument panel, forgets to pop the hood and flies the aircraft down to "ground zero." It has happened more than once.

How about the chase pilot? Yes, it is mandatory to have a chase plane during hooded approaches but the chase pilot can not always issue a warning in time or anticipate excessive sink rate close to the deck.

A requirement for a hooded approach, with an accompanying chase plane, is a satisfactory three-way communication check between aircraft and GCA. Until approaching the glide path the controller keys his microphone only when transmitting instructions. Once he says "do not acknowledge further transmissions" the controller keys his microphone continuously.

The question arises: "Can the chase plane transmit satisfactorily to the hooded aircraft while the GCA controller is continuously keying his microphone?" One squadron flight checked this situation and came up with the following information. "Both aircraft were positioned in the normal GCA pattern," said the report, "and conducted radio transmission checks while the GCA controller was continuously keying his microphone and transmitting mock instructions.

"Approximately 25 transmissions were made during final approaches of from 8 miles to 1 mile . . . on both GCA channel and Guard. On all transmissions the chase plane was able to 'block out' the final controller. On all attempts the simulated hooded pilot could satisfactorily hear the chase pilot. It was impossible to 'raise' GCA from either the chase or hooded aircraft due to the GCA transmitter blocking out the GCA receiver.

"Communications between the chase plane and hooded plane were satisfactorily utilizing Guard, however there was a definite time lag involved when the chase pilot switched his transmitter to Guard. This delay was timed at 5 to 8 seconds, depending on how fast the chase pilot can rotate the channel selector from one extreme end of the dial to the other plus the normal time lag for the gear to reset to a change in frequency."

Although Ground Controlled Approaches may be made by a pilot who has never attempted one before—saves have been made with civilian pilots in everything from *Piper Cubs* to multi-engine transports—don't be misled. Practice is profitable. Have fixed in your mind the way your aircraft behaves on a glide path and work on speed control. If you shift over to another type or model, check its GCA characteristics. From the GCA controller school comes this advice, "Always remember that GCA is no substitute for pilot qualification."

The FUR/EFR System is the Navy's means of collecting and compiling service experience on aeronautical material in the interests of reliability, safety and economy. The success or failure of the system depends entirely upon the accuracy of the information provided by YOU in YOUR

CONSUMERS' REPORT

A major problem facing us in naval aviation today is the need for greater reliability of its aircraft. The problem is to stem the rising tide (35%) of all major aircraft accidents and FLIGAs numbered in the thousands, caused by material failure.

To achieve the ultimate in material reliability, BuAer about four years ago launched the Material Reliability Program, and recently BuAer and the Safety Center sponsored a second Navy-Industry conference on material reliability. Both undertakings have as a common objective the improvement of aeronautical equipment. However, before changes in design can be made service information is needed from users and this is accomplished by the FUR System.

The working tools of this system are the FUR (Failure, Unsatisfactory, or Removal Report) and the EFR (Electronic Failure Report), which are

OPERATION ANALYSIS MUST BE PROMPT AND ACCURATE
SQUADRON to *NATSF* to *PRIME* to *VENDOR*

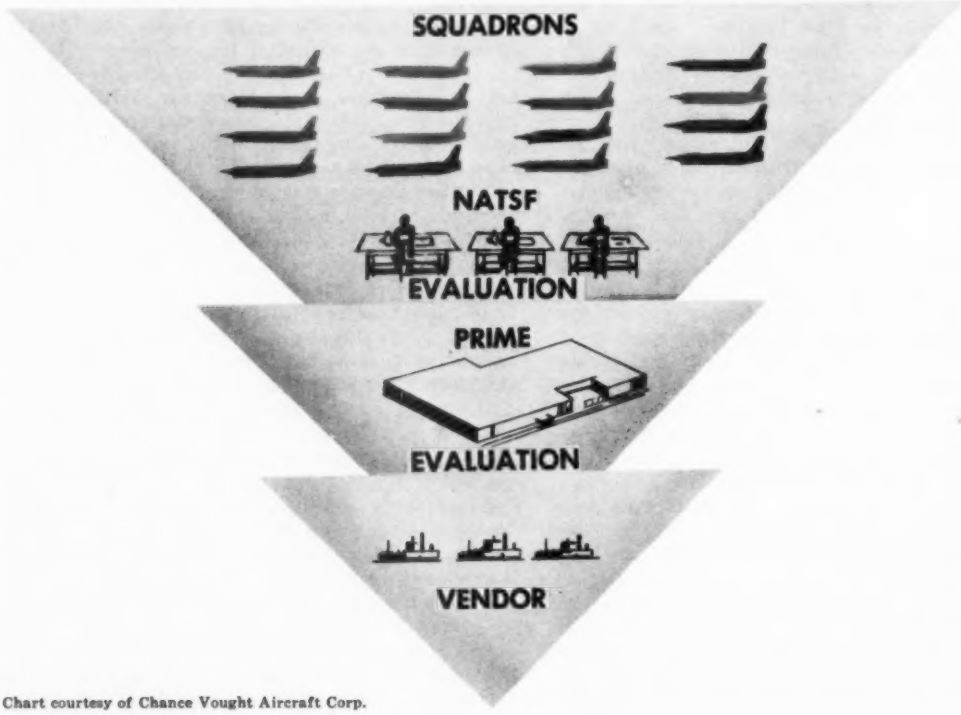


Chart courtesy of Chance Vought Aircraft Corp.

Performance Evaluation is Necessary

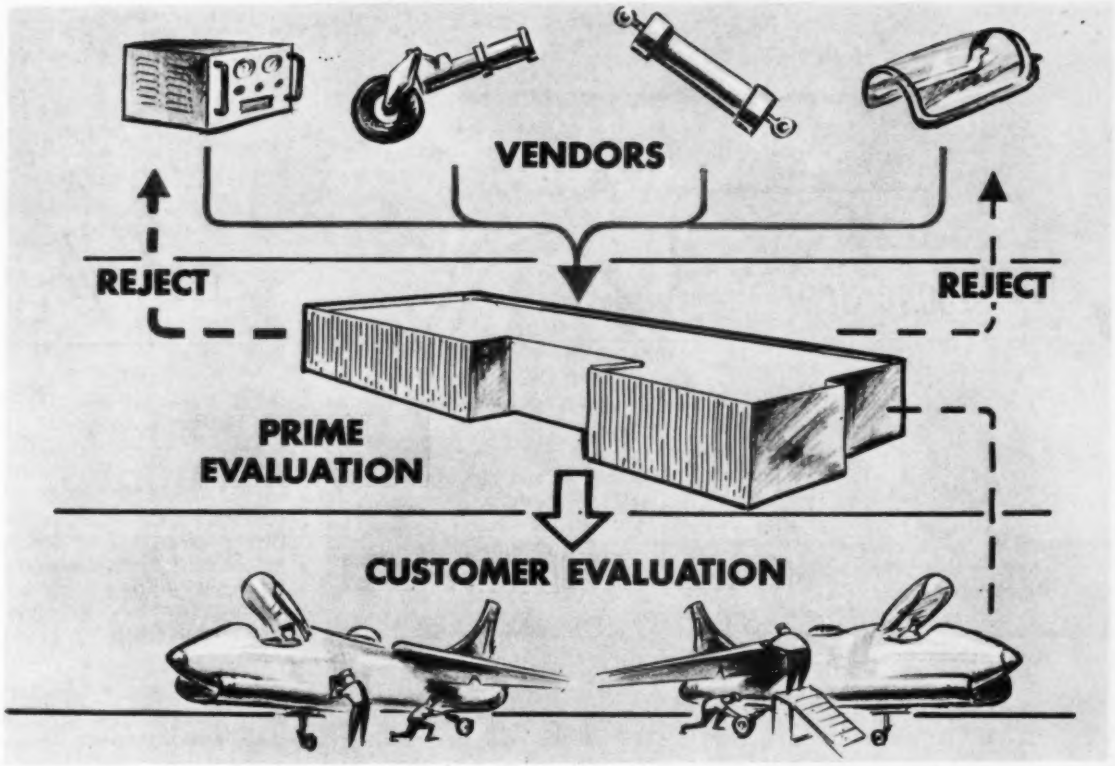


Chart courtesy of Chance Vought Aircraft Corp.

designed to obtain service experience from the most accurate sources and, by mechanized processing of the data, provide the necessary management information for an effective reliability program. The system combines several clerical procedures to promote simple and accurate reporting of all significant service experience. From these data, BuAer through its Naval Air Technical Services Facility (NATSF), and its contractors can perform both statistical and technical analysis of service experience in a rapid and timely fashion and take positive steps to insure more reliable equipment in service.

In the development of the Material Reliability Program to date, action has been taken to obtain a more expeditious review of equipment reliability by both the equipment manufacturer and the cognizant government agencies; a closer monitoring of the areas requiring corrective action for proper evaluation of the most effective design improvement, and an insured return flow of information to operating activities to guide their maintenance efforts and operational planning.

All activities are urged to give utmost support to the Naval Aeronautical Reliability Program not only by strict adherence to the detailed instructions (BuAer Instruction NavAer 00.58B) but also by exercising a conscientious effort to achieve the intent of this program. In this regard the assignment of competent personnel to supervise and review FUR and EFR report preparation is essential, particularly when such reports involve priority corrective action on new aircraft. Amplification of deficiencies, completely and accurately defined, will insure that the contractor responsible for corrective action is supplied with a workable knowledge of the problem.

The FUR is indeed your best bet for it will return a safer and more reliable product to the aircraft thus helping to stem the rising tide of accidents caused by material failures.

ANYMOUSE

AND HIS HAIRY TALES

AIRCRAFT was a TV - 2. ADF penetration number one was assigned by APC. Penetration was started at 29M. Tracking inbound, GCA requested gear down and a left turn for positive identification. GCA acknowledged a positive return and proceeded to turn us onto downwind, base and onto final approach. Waveoff was given at the beginning of final descent when GCA lost target.

Two more patterns were flown with waveoffs on final descent due to loss of target. GCA advised that they were alternately painting and losing target during all patterns. At the end of this third waveoff the latest alternate weather was requested and received: 9 ⓘ 12 ⊕ 1 RF. This report was lower than the forecast weather on the clearance and led us to believe that no advantage would be gained by going to the alternate.

One more pattern with a waveoff followed, making a total of four. The situation in both cockpits was disintegrating into a welter of confusion, puzzlement and hysteria.

On the fifth approach the pilot asked GCA to descend us below 529 feet. GCA advised they could not, due to lack of positive altitude control. The pilot descended down to 200 feet, still in the soup, but the reported weather indicated that at 200 feet we should have visual contact.

At this time the stunning thought struck the cockpit. Both pilots had been misreading the altimeter. The aircraft was actually at 10,-200 feet instead of 200! Now aware of the mistake a rapid descent to 1500 feet was made and on the GCA final, visual contact was made at 250 feet one mile from the runway.

Touchdown was made with less than 200 pounds and we shut down with about 100 pounds. Both pilots were thoroughly shook and a lasting impression concerning proper altimeter reading was made.

► *Please see "Passing through 12,000 . . ." page 36.—Headmouse.*

PREFLIGHTER

AS COPILOT of an HRS-3 I preflighted the aircraft and saw cracking of metal cowling over the tail rotor drive shaft. Although the rear extension cowling was secured by a hold-down strap, the crack (about 1½-inch long) was so located that cowling could give way during flight.

Upon application of slight pressure from my thumb the crack lengthened to 5 inches. The aircraft was "downed" due to the probability that the cowling would give way during flight and foul the tail rotor.

► *No hairy tale here but it shows that good preflighting can prevent them.—Headmouse*

GCA CROSSWINDS

ON A local instrument training flight in a TV-2 (IFR clearance), penetration was commenced with

The purpose of Anymouse Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hairy or unsafe flight experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in readyrooms and line shacks. All reports are considered for appropriate action.

— SUBMIT AN INCIDENT, PREVENT AN ACCIDENT —

weather reported 400 feet overcast, one and one-half mile visibility in rain and fog. A satisfactory radio check with GCA was obtained before pushing over.

Upon reaching 1500 feet I was informed that I would be brought into GCA minimums then waved off to make a VFR approach and landing on a perpendicular runway. The wind was 25 to 35 knots directly crosswind to the GCA runway.

When I finally broke out it was at 200 feet instead of 400 feet and I estimated the visibility at only one-half mile. I was given a GCA waveoff but was unable to see the landing runway. Upon executing a missed approach I was told it would take about a half-hour to get GCA set up on the duty runway. Commencing a holding pattern I filed for the alternate.

After much consternation and many unhappy moments (lost UHF except for Guard and birddog swung confusingly) I landed at my alternate with the gages showing a little more than 400 pounds.

Some facts which I gathered later are: The wind had been down the duty runway for at least six hours prior to my penetration and stayed that way for six hours after my missed approach. Weather and wind direction was just what aerology had been forecasting.

The reason given for continued use of the GCA runway with a high cross wind was that GCA preferred, when practical, to use the straight-in runway (from the radio fix) which has high intensity runway lights.

I maintain that it was not practical on that day!

I recommended that all pilots check with GCA before penetration to be sure the GCA approach is to be the duty runway and that GCA units make every effort to get set up on the best runway, and finally that the tower and aerology keep everyone up to date on the latest weather. This is particularly important when the forecast is for weather near minimums.

CLIFF HANGER

I WAS picked up by GCA out of penetration turn at the completion of a routine instrument hop "under the hood." A request for an approach to touchdown was granted. As my F9F-8 approached the glide slope to the right of centerline, correcting to the left, the chase plane began dropping back to assume a landing interval. Chase was on my left and slightly high.

Continuous above glide path transmissions were given even though I gradually increased my rate of descent to about 1200 feet per minute. Suddenly the chase plane called *"Wave off!"* and the same transmission came from GCA. I popped the hood, added 100 percent and saw the ground going by approximately 300 feet beneath me. I was still about two and a half miles from the end of the runway.

The incident happened thus: As I was to the right of centerline the chase plane was on the left, lined up with the runway, and he began dropping back and descending shortly after GCA called me to start my descent. The controller assumed that the chase plane was the aircraft making the approach and did not catch the error until I became dangerously low. The chase plane, behind and above me, had difficulty determining my altitude until I began to blend in with the trees. Had he been unable to contact me it might have been too late to shift to Guard.

On GCA approaches to touchdown I suggest the chase plane maintain his position and waveoff rather than take an interval to land at the same time. This would be less likely to confuse the controller and the chase should be able to determine altitude more accurately. Had I kept closer track of my altitude I would have realized I was reaching the point of no return before it was necessary for the chase pilot to warn me.

Please turn page

Continued from preceding page

The best means of overcoming panic is knowing where to go, what to do!—*Facts & Trends, NBFU*

FREQ CONFIRMER

WHILE shooting TACAN approaches with a GCA pickup, it was necessary to switch from GCA back to approach control frequency at the end of a pass. I was a chase pilot in a *Cougar*.

After our first pass we started a VFR climb and, in order to conserve fuel, we climbed outbound on the reciprocal of the inbound heading so upon reaching altitude we'd be set up to start another approach. Just before reaching altitude I saw two FJs turning towards us. I called the lead pilot but got no response. After several more frantic calls I realized he wasn't receiving me and then, almost too late, he saw them and we both veered out of their path. They passed within 100 feet of us and it was obvious they didn't see us.

Then I realized why my playmate was not receiving me. I had goofed. After leaving GCA frequency he switched properly to approach control while I went to our tactical frequency. If a definite radio check had been established on each channel change, this situation would have been avoided.

Also, climbing outbound on the inbound approach leg can lead to dangerous situations even in VFR weather.

I recommend a definite verbal radio check between playmates on every frequency change, and a heading on an outbound climb which differs by at least 20 degrees from the inbound approach landing.

Two Million Americans Have Never Seen the Elephant

IF THE circus should disappear from the American scene, it would mark the passing of an era. Same old stuff, animals, stunts, and ballyhoo. But we should all be compelled to see the circus every year because it's a great lesson. Yep, same old elephant, only a year older; but remember, since last year's circus over two million babies have gotten old enough to appreciate a circus.

So you sometimes get tired of the same old routine about safety, fire protection, passenger protection, and all the problems that go with them! So do we, but there are a lot of new people in our ranks since last year, too. That's one reason we keep going over the basic stuff. You may be bored with the same old elephant, but from a lot of people we hear, "So that's an elephant!"

TV, which is reported to be a principal cause of the circus' troubles, uses the same technique of repetition. They have the same self-renewing audience.

The moral of this story is—no one really ever knows all there is to be known about preventing accidents, and no one ever will. As soon as anyone reaches the point where there's nothing new to learn about a job, it's a good time to look up an undertaker because it's the start of the dying process.

In fact, statements like "I'm too smart for that stuff," or "I've forgotten more than most of 'em will ever know," should be listed among "Famous Last Words." We know it's true, because everyday supposedly experienced people do some awfully silly things that result in accidents.

—*National Safety Council*

SHORTED OUT

ANYMOUSE was in a single-engine prop aircraft going IFR from North Carolina to Chicago. About 30 miles northeast of Charlotte, N. C., the omni went out and there was a max indication on the load meter.

"I immediately notified Charlotte radio of an emergency," Anymouse said, "and requested an immediate range approach to Charlotte airport."

Just after getting clearance to descend to the minimum en route altitude the VHF receiver went dead. Anymouse began descending and proceeded toward the range station. About this time the regular aviation weather broadcast came on (Charlotte 500 overcast, 8 miles) but before reaching the range station the LF range receiver gave a last gasp. "I was told by the other occupant," added Anymouse, "that smoke was seeping from the baggage compartment."

Undaunted, he turned to his last piece of nav gear, the ADF which had previously been tuned to Charlotte. On final approach, at minimum altitude, the aircraft was in a ragged ceiling and here—Yup, you guessed it. Goodby ADF.

"Squeeze the altimeter a little lower and we're out of the clouds with an uneventful landing," sighed Anymouse. Damage to aircraft: One burned out battery. The cause was an improperly connected reverse current relay.

UHF/ADF 180° OUT

"COMMENCING a cross-country from the southeastern coast up to Boston, I climbed into my big *Banshee* and waited for my clearance. The weather was IFR enroute as well as at the point of departure, but the weather briefing was a complete one and I felt I had a real good mental weather picture of the route.

"After about one hour's wait I received the clearance exactly as I had requested it and launched into a 500 foot overcast. All went well on the climbout (utilizing radio range) but about 40 miles out the TACAN went out. Since I was using this only as a source of additional information, I resigned myself to the fact that I would have to do without this luxury and proceeded with my ARTC clearance. The first, second and third check points all passed right on schedule, all the while on instruments in the soup.

"At the start of the fourth leg, some 240 miles long, I noticed the ADF would not 'home' as I tracked outbound. Also, I was unable to identify any radio station although I had received station passage not 5 minutes earlier. Thinking I had accidentally hit the radio and moved it off frequency, I tried to retune it — it was just so much extra weight — not a dot or dash could I get though I tried five or six radio stations in the vicinity.

"While this was going on I had been trying to hold a correction for a wind of 110 knots off my port beam. I was experiencing a little difficulty in accomplishing this and also found myself climbing from my assigned 37,000 feet. Feeling

slightly angered at myself for letting this happen, for I felt I shouldn't have let my instrument scan break down, I stopped working on the radio and tried to get the aircraft squared away.

"'Always believe your instruments' was drilled into my head many, times times, but something was wrong, for the flight instruments were arguing and refused to agree. Finally I detected what was wrong. The instrument failure warning system was inoperative and the little 'off' flag on the gyro horizon only dropped part way out. Switching to an alternate invertor source got the attitude gyro working normally but the gyro compass still was not functioning.

"Still no luck with the ARN-6. Well, I decided to use the only piece of radio gear still operating — the UHF. I tuned in a UHF homer to a Naval Air Station. It came in loud and clear but indicated that I had passed the field and was out over the Atlantic somewhere. This was impossible, for I would have had to have a tremendous tail wind, one that was not mentioned in the weather brief.

"I decided that I had just about exhausted everything that I could do for myself. I needed help and the sooner the better.

"Calling on channel 10 I soon received an answer to stand by for

Continued from preceding page

a controller. The controller was up up on UHF almost at once. I then gave him as much information about my position as I could and indicated what difficulties I had been experiencing. He was able to identify me very shortly and gave me a vector to the next check point. Then he passed me the ground speed and wind. It was only 45 knots and not 110 knots as briefed.

"There was supposed to be a high overcast in the area I was passing and I was hoping this was still around. I got a weather check for a large air station which could repair my electrical system and got confirmation on the high overcast. I decided to land short of my destination so GCI vectored me out to sea for a letdown and I broke out at 25,000 feet. With a little more vectoring I arrived at the field and landed.

"The air station worked for two days to get the aircraft into an UP status. The UHF, ADF was okay but seems as though the needle was 180 degrees out of phase—another application of Murphy's Law? I now check all UHF, ADF's prior to flight.

"Personally I can not think of anything that I could have done to prevent this (the aircraft has no previous history of trouble and was selected as the best available). As for others who may find themselves in a similar situation, don't be afraid to ask for help when you need it. You are only cheating yourself the longer you wait or debate."

FAIRWAY

WHILE experiencing difficulty with the MAP regulator on the starboard engine of an AJ-2, I commenced a turn toward the field, about 10 miles distant. While in my right turn I saw a commercial airliner pass from port to starboard at about one-fourth mile, apparently on or close to my altitude.

I made a rapid descent in order to pass below and to the rear of the transport and he took no evasive action. I recommend extreme care in operating on airways plus, while crossing airways, avoiding any turns or maneuvers which would result in restricted visibility.

DEFROSTER

ON A recent flight in an SNB from Ithaca, N. Y., to Quonset on a very cold day, moisture froze on the inside of the windshield reducing visibility to zero. It was necessary that the frost be scraped off the windshield, and, of course without any proper scraper. After an hour or so conditions changed and frost did not reform.

On landing at Quonset a trip was made to the exchange store where a plate and bowl scraper was purchased. Most aviators are familiar with this handy little stick with a flat rubber tip. Because the tip is rubber it is flexible enough to bend with the curve of windshields. The scraper more than paid for itself on subsequent winter flights.

POWER CHECKED

FOR my takeoff in the A4D-2 I *hold* brakes, power to 90 percent, *check* instruments (all normal), *release* brakes and *start* rolling. Gads! This bird seems underpowered—only 98 percent. Oh well, TPT normal and lots of runway (8000 feet) so I keep on rolling and get airborne.

At about 1500 feet, while making a routine cockpit check a bright red light stared me in the face. I had just made my takeoff in manual fuel control. The climb was continued to 10,000 feet where I throttled back to idle and shifted to primary. Not the preferred way to check out manuel fuel control but it does work even on takeoff in an A4D-2.

WHIZ QUIZ

1. At what altitude does the continental control area begin?

2. You have filed an IFR flight plan and your ETA at destination is 0945. The forecast at destination is 4500 ft. scattered, visibility 7 mi. with haze decreasing to 4 mi. around 1130. Is an alternate airport required?

3. Which of the following is the proper identification to be used in an initial voice call-up of A/C Bureau No. 123456?
   a. Navy 456
   b. Navy 3456
   c. Navy 23456
   d. Navy 123456

4. When filing a DD 175 for an IFR flight, you must indicate in the remarks section the type of approach to be used at the destination and at the alternate, if an alternate is required. True or False?

5. How is the ETE for a flight plan computed?

6. A pilot cancels an IFR flight plan by requesting cancellation from ATC through the nearest communication station and receiving confirmation from ATC. True or False?

Answers on Page 48

HEADMOUSE

Have you a question concerning aviation safety? Send it in to Headmouse and he'll do his best to help.

Flight Gear

Dear Headmouse:

"Do You Dress The Part?" (June 1958 APPROACH) says you'll perspire profusely while wearing the recommended G-suit *and* summer flight suit . . . how very right you are! Being an AD pilot in Florida, the perspiration and discomfort becomes intolerable on a 2- to 3-hour low-level hop culminating in a loft maneuver . . . you get dehydrated, fatigued, inefficient, and often nauseated. The canteen of water gets warm—ugh. I consider this condition to be dangerous and would rather relieve it by taking on the slight added risk of fire without a flight suit; what are your thoughts? And what about the corset type G-suit? Heard about 'em but no sign of 'em in my outfit.

New but related subject: How do you get pilots to wear proper protective flight gear? I get a stock answer of "It's my neck, what are *you* worried about? Go peddle your safety posters." I hate to take this outlook, but doggone it, legally a pilot is risking the government's airplane and their dollar investment in *him* when he doesn't use all the safety equipment made for him; he shouldn't have any right to decide that he's taking the risk himself. Is there any directive that says, "thou shalt" in plain language? Please help me to help my guys.

FSO
(Frustrated Safety Officer)

► Supply Logistic Support Info Bulletin 163 says that over 15,000 cutaway (Z3) anti-blackout suits are on contract. As of 1 Oct nearly 700 had been shipped, to Cecil, El Toro, Corpus, and the largest lot to ASD, NASC Oakland. Changes in the specs have delayed continuing delivery on the balance, but they expect to have them all delivered by April 1959. Check your flight surgeon and back issues of APPROACH for fatigue and heat prevention tips.

As for your reluctant pilots, OpNav Inst 3710.7A, page 18, paragraph 3 on Safety and Survival contains some ammunition; also, if the skipper, XO and Ops all wear the right gear at all times and drop a hint that it's the only approved flying uniform, you should get very few stubborn non-conformists.

For the latest info on modification of anti-G equipment see BACSEB 26-58 of 30 Oct. '58.

Very resp'y,
HEADMOUSE

Deferred Emergency

Dear Headmouse:

. . . In the opinion of the Naval Aviation Safety Center is there such a thing as a "deferred emergency?" This discussion has come up in every tower that I have worked in, either because of its use, or misuse.

Apparently the definition of a "deferred" emergency is where the pilot has a suspicion of, or actual mechanical trouble or some other condition, but does not consider it serious enough to call it an "emergency." The pilot may or may not request priority in the pattern; might state "no waveoff this approach," and says the crash crew won't be necessary.

In some of these instances, the pilot may declare a deferred emergency; in others he simply advised of his difficulty, leaving the decision for the tower or operations duty officer on whether or not to alert the crash crew.

I maintain that you either have an "EMERGENCY," requiring emergency equipment standing by the runway or you don't have anything to declare. If trouble in flight is suspected, and/or minor trouble that could cause loss of an engine or other major trouble, I figure it should be declared an emergency.

I don't think it hurts anything or anyone involved on the ground to be alerted for an inbound emergency. If the aircraft lands safely and none of the equipment is needed —well fine, we just had a good drill. I've always wondered about these "no-sweat-jobs" — deferred emergencies—whether or not it will be no sweat or if everything is going to break loose suddenly (I've seen several that were quite embarrassing).

Now sir, am I right, or am I all wet?

TOWERMOUSE

► First off, the word "deferred" has no official status as far as being a type of emergency is concerned but through usage it has picked up a little weight and authority. Custom and tradition are powerful enemies sometimes, so you're not going to stop people from using it because it isn't official.

The word "deferred" itself means, according to Webster, "to put off, delay, postpone; as a right that does not begin . . . till a future time; withheld for or until a stated time." Using that meaning there aren't really many situations which could strictly be called "Deferred" Emergencies. About the only one which comes to mind would be a pilot with landing gear or brake trouble who has plenty of fuel and wants to fly around awhile and lighten his load before attempting a landing.

However, mouse cousin, if a pilot says he has a deferred

Continued from preceding page

emergency and wants a priority, don't argue. Treat it as if he had used the urgency signal (PAN) to announce his troubles. (The urgent signal is more appropriate for this discussion, as MAYDAY is the distress signal).

Very Resp'y,
HEADMOUSE

Raft Transmitter Use

Dear Headmouse:

The escape chute door in an F3D came open while the cabin was pressurized. It knocked the voltage regulators off their mounts and all electrical power was lost. The aircraft flew a triangular pattern for ages and no GCA station noticed. The crew of two bailed out over the overcast and landed safely near the base. The aircraft was lost needlessly, for the use of the raft radios would have alerted other aircraft who could in turn have alerted GCI and intercept would have been made.

I ran an experiment and found that this little radio will transmit from inside the cockpit right through the side glass and windshield. Since I have never seen any word passed to all pilots to think of its possibility, I believe you should pass the following word plus some that you may want to add of your own, once you run some tests on this raft radio. (I contacted an aircraft 70 miles away.)

1. See that all F3D escape chute doors are fixed so that even if they come open accidentally they can not damage the voltage regulators.

2. If the top hatch is opened you can fly below an interceptor and penetrate even if the windshield is iced and fogged.

3. The raft radio has 100 mile line of sight capability.

4. The antenna need not be outside the cockpit or fully extended **although** in **some** aircraft it would be easy to poke the antenna out a top hatch or side window or any opening top, side, bottom of aircraft, etc., as long as the antenna doesn't touch the sides.

5. The radio has VHF and UHF guard plus tone, and **tone** will enable an interception with UHF-DF to take a bearing or home in on the distressed aircraft, particularly if the speed, heading and altitude of the distressed aircraft is given the interceptor.

6. The side of the raft container can be felt for the location of the radio and a slit made with a knife to remove the radio without the pilot going to the trouble of removing the raft.

7. Caution pilots and crew to think of oxygen requirements while using this radio at high altitude.

8. Don't expect to receive much over the radio due to noise from the aircraft.

9. Toy with the idea of plugging the pilot's head set and mike into the radio so he doesn't have to remove his mask, and why not have a small aux antenna that a pilot can plug the radio into so he can transmit from the aircraft (as IFF is gone when all electrical power is gone). How about going even further and fix it so the pilot can transmit while descending in his parachute??

MSgt. J. A. MKAYHEW (NAP)
VMCJ-1, MAG-33
MCAS, El Toro, California

► The basic idea sounds great, Sergeant—shows what can be done with what you've got when you don't have very much.

However, there are a few items that should definitely be borne in mind regarding your recommendations:

Single-seater pilots won't find it easy to get the PRC-17 out of the container in flight. And if it doesn't perform as advertised, the pilot is deprived of his raft.

If you can't see where you're carving and damage your 'chute,

Shoot Seat Development

Dear Headmouse:

Your October "Shoot Seat and Light" article has offered us a reason to help renew the complainant's faith in his fellow naval aviators engaged in test, evaluation, and development of naval parachutes and associated survival equipment at the Naval Parachute Unit, NAAS, El Centro, Calif.

Yes, as far as the "Shoot Seat" part of your article is concerned, the Naval Parachute Unit has developed, successfully tested, and evaluated a low altitude Ejection System which employs a ZERO DELAY AIRCRAFT-TO-ACTUATOR LANYARD. This lanyard was developed for use in aircraft that have automatic lap-belts and automatic parachute (Irvin Mk 5 or Master Specialties) actuators. The complexities of our Navy preferred automatic equipment prevented the adoption of the Air Force lanyard system.

Here's how it works. Our lanyard arms the automatic parachute actuator time - delay - mechanism (cartridge in the Master Specialties type) *at ejection* instead of after complete man-seat separation. This enables the actuator to pull the ripcord pins about 1.5 seconds earlier than in the normal ejection event and thereby causes the parachute to deploy when the pilot has reached approximately 20 feet below flight level of the abandoned aircraft.

This system is effective for recovery of pilots ejecting from aircraft at altitudes as low as 200 feet (above the terrain) and at speeds within the 120 to 350 knot range. The ZERO DELAY AIRCRAFT - TO - ACTUATOR LANYARD must be unsnapped by the pilot when above the speed limitation to prevent the chance of jeopardizing the successful operation of the normal altitude ejection system presently relied upon.

At present, the ZERO DELAY AIRCRAFT - TO - ACTUATOR LANYARD is slated for ENVIRONMENTAL USE evaluation by two Fleet units. The lanyard will be used in their F9F-8s, FJ4 and 4Bs, and *FOOORRRDDDS*. We hope the "Lanyards" will reach all the other appropriate units soon.

NPU

► Headmouse extends thanks to NPU in behalf of the many other "interested parties."

you'd better not plan on needing it . . .

If, after getting the radio out, you wind up ejecting or ditching, the radio can be a mighty dangerous missile in the cockpit . . . don't leave it on your lap. And, even if you get rid of it, what have you done to the gear you're still sitting on? What is it going to do when you pull the curtain?

Some outfits have substituted a radar reflector for the PRC-17 radio; pilots should know what they'll find when carving into the raft.

Aircraft fuselage is an excellent shield to UHF emissions . . . remember the T-28 VHF problem where GCA was blanked out on final when the aircraft nose was raised?

Don't mean to throw cold water on a good set of thinking, Sgt., but believe all should be aware of these items when considering the procedure you describe.

It sure was disturbing to read about the triangular pattern producing no results. And thanks again for passing along your thoughts.

Very resp'y,
HEADMOUSE

WHEELS-UP SAVES

BOX SCORE

Wheels-up landings, unintentional, pilot-induced

Total number of wheels-up landings Jan to Nov 1957	32
Total number of wheels-up landings Jan to Nov 1958	38

NAME	STATION	ACFT.	DATE
Lebert, F. J., AT3	NAS Miramar	F4D	10-27-58
Bjornberg, A. M., ACT3	NAS Norfolk	F9F	10-15-58
Dunaway, D. L., TSgt	NCAF Iwakuni	SNB	9-25-58
Guill, H. E., AC1	NAS Corpus Christi	AD	9-26-58
Graves, J. R., AN			
Wallington, J. C., ACTAN	NALF Crows Landing	AD	9-25-58
Wilford, G. F., AM3			
Wood, C. D., AN	NAF Monterey	JRB	9-16-58
*Kreps, F. W., HM1	NAS Glynco	F2H	10-14-58
Paulson, R. F., AN			
LT W. E. Nelson	NAS Oakland	TV-2	9-12-58
Hines, H. L., AN	NAS Memphis	SNB	**NR
Rusko, M. M., AA	NAS Memphis	F9F-6	**NR
Carter, R. B., AC1			
Wooley, G. C., AC2			
Vinson, J. G., AN	NAAS Saufley	T-34B	10-24-58
Jacobs, B. E., AN	NAAS Saufley	T-34B	10-24-58
Lea, J. O., AC1	NAS Barber's Point	F9F-5K	10-17-58
Brown, A. A., ADJ3	NAS Miramar	F3D	11-4-58

* Second Save

** Not Reported

". . . So I says to him, 'Emergency, Hell, NOBODY lands wheels-up on my watch, so WAVEOFF!' "

TIGER ON THE LOOSE!

THE need for supervision is generally recognized. The degree of supervision needed and the manner in which it should be applied can hardly be defined to cover all circumstances. Most often it's only after the fact that one can say with some assurance, "I should have watched him more closely."

Those who deny the need for supervision are quite often those who need it most. To wit . . .

A junior aviator argues at the bar until after midnight that first tour pilots are too closely supervised, that they are capable of flying high-performance flying machines and yet aren't allowed in the air without a senior pilot riding herd on them.

Next morning he launches for a live missile firing exercise — with a senior pilot riding herd. Due to adverse weather the senior pilot decides to abort the mission and return to base.

On the return flight the junior expressed a desire to see a guided missile cruiser which was known to be in the area. The cruiser was conducting firing exercises. The senior pilot led the section into an orbit well clear of the area, pointed out the cruiser and resumed flight to base.

Upon landing rollout, the senior blew a tire due to a locked brake and veered to the edge of the runway. The youngster took a waveoff and was instructed to burn down prior to landing.

Right at this point the chain broke—the supervisor was on deck and the supervised was in the air with fuel to burn—somewhat in the same position as the schoolboy in an amusement park who's handed five dollars and told to "get lost" until three o'clock—wowee! Tiger On The Loose and money in the pocket!

Back to the cruiser scooted the youngster, for a real close look at the "boat Navy"—or was it his intention that the cruiser people have a real close look at the air Navy? We'll never know for sure, but see what you think . . .

Witnesses' descriptions of the aircraft's maneuvers varied widely, as might properly be expected from non-aviation personnel. It was pretty firmly established though, that the aircraft made a low pass close abeam, at about bridge level, performed several aileron rolls (variously described as "wing-overs," "barrel rolls" and "snap rolls") and sharply reversed course at the top of a "victory roll" to make another low pass in the opposite direction.

The pass in the opposite direction was pretty much an encore, with "waggling of wings," and by this time the lad had achieved the status of Sarah Bernhardt—he had the undivided attention of his audience, including some equipped with "opera glasses" and gun directors. After the sec-

ond pass the pilot again climbed steeply and began to reverse course in a half-roll. During the attempted pullout, vapor trails from the wingtips were reported by several observers. The pullout was never completed. Reports varied as to the degree of pullout achieved before the aircraft struck the water, but all agreed that no attempted ejection was noted. The aircraft exploded on impact; by the time the cruiser arrived at the scene there was only some dye marker to mark the scene. The few pieces of equipment and aircraft that could be gathered would not fill a commissary shopping cart.

So much for the accident itself. Care to unload yourself of a few thousand words on the subject of flathatting, unauthorized flight maneuvers, violation of gunfiring areas, need for close supervision? Most of the AAR endorsers did, and most of them pointed to the previous night's discussion about supervision as an ironic example. His squadron rightly recognized the need for close supervision and was providing it. They just couldn't go to ridiculous extremes and anticipate *every* remote eventuality.

This pilot's action was quite extreme — one might well wonder what went on in the mind of an aviator who commits such flagrant flight violations in full view of such a large audience. But first tour junior pilots are often exposed to somewhat less extreme temptations which, without adequate supervision, can have just as deadly results.

Supervision is an admitted necessity. Those who apply it should know how to use it wisely, for one can supervise without even conveying the idea that supervision is being applied. Those upon whom it is applied should accept and recognize supervision, not as an evil, dominant pressure, but as a means of guiding persons with limited experience through the early, formative stages of their flying experience, until they reach the stage where their own experience is the supervisor, where they can see and appreciate the need for overseeing the ones with less experience.

The supervisor, while acting as such, is a teacher and rescueman as well as policeman; he's there to help and advise as well as to deter and admonish. Those who doubt need only consider the case of the pilot mentioned here—he'd never have experienced such a final fate if a supervisor had been present.

If the supervisor has to turn his head away for an instant, is that an opportunity for you to dash off on your own and pull the lion's tail?

Remember, the lion isn't tame—he's just waiting for someone like you to get one bit too close, and CHOMP!

Be your own supervisor!

HOT BRAKES

The sixth full stop landing was planned as a no-flap landing. With the bitter end of the runway in sight the pilots found it was also a no-brake landing.

THE duty runway was 5000 feet long and the wind was 5 knots. An S2F in the pattern had made 5 full stop landings and the sixth was planned as a no-flap, full-stop. On the downwind leg the pilot under instruction stated that the landing check was performed, including the pumping of both brakes.

Touchdown was made about 1700 feet past the approach end of the runway at about 85 knots. Intermittent braking slowed the S2F normally and as the upwind arresting gear was passed (1000 feet of runway remaining), the instructor pilot told the pilot being checked out to hold his brakes. With this steady braking the aircraft decelerated to a rate slow enough to begin a 180-degree turn near the end of the runway. At this point the starboard brake faded.

The pilot at the controls immediately released foot brake pressure and pulled the parking brake. That did no noticeable good as the instructor pilot applied his brakes and attempted a ground loop to the right with full port throttle. With the power on, the S2F commenced a wide arcing turn but picked up speed. Power was chopped and the aircraft went off the runway, through a short overrun and dropped off a 10-foot bank into the water. Both pilots abandoned uninjured through their overhead hatches.

Investigation of this accident, said the accident board's analysis, plus past records of this activity indicate that S2F brake efficiency is reduced when the brakes are hot. Heat within the wheel brakes generated by extensive use does not have time to completely dissipate between landings when the aircraft remains in the traffic pattern. With this condition present, it is considered possible that a point will be reached when maximum foot pressure on the brake pedal will result in marginal brake action.

The pilot was aware of his

landing configuration and by his own admission realized he was landing well down the runway. Neither pilot was greatly concerned about the ability to slow the aircraft for a safe turnoff but what they failed to allow for was the increase in touchdown speed in a no-flap condition. This is approximately 10 knots faster than under a full-flap configuration.

In this particular instance neither pilot recognized the inherent dangers in landing long on this 5000-foot runway, half of which has a gradual down hill grade. Had they considered the distance remaining after touchdown, the possibility of reduced brake efficiency brought about by cumulative brake heating on the five previous landings, and the light wind condition (5 knots), the only logical action to be taken would have been to take a wave-off.

As a result of the board's recommendations the squadron adopted a policy of requiring a 20-minute brake cooling period following each series of two full stop landings and secondly that no-flap landings are to be discontinued on the 5000-foot runway whenever the wind velocity is less than 10 knots.

HASTE AND WASTE—A practice low altitude bombing strike was scheduled for the A4D's during mid-morning and one *Skyhawk* was waiting for launch on the port cat. The second *Skyhawk* scheduled to be launched was in the number one ready spot, about 15 feet behind the port jet blast deflector. The pilot of the number 2 A4D held his throttle at idle until the catapult officer gave the aircraft ahead a "two-finger" turnup. "I immediately advanced power to 70 percent rpm and held the brakes," said the pilot of the second A4D. His intention was to expedite moving onto the catapult.

As the aircraft on the catapult was shot off, the blast deflector operator started lowering the deflector. At the same time the catapult plane director started bringing the second A4D forward with an "agitated come-ahead."

The safety man on the nosewheel steering bar (tiller bar) thought the plane was going a little fast as the "tiller man" was doing a "pretty fast trot" to keep up with it. "Then I saw that the jet blast deflector was still going down," said the safety man. "I had an idea that the plane was going to hit it, so I tried to help the tiller man turn the steering bar so we would miss the deflector, but we were too late."

Seeing a collision imminent, the plane director gave an emergency stop signal and the pilot immediately applied the brakes. However, the jet continued forward, striking the deflector and breaking off the nosewheel. Hy-

The blast deflector was still moving down as the A4D nose wheel struck and broke the strut.

Continued from preceding page

draulic fluid sprayed from a ruptured oleo but there was no fire.

Though the plane director was at fault for not visually checking the position of the blast deflector prior to moving the A4D forward, the standard of taxi signals appeared worthy of discussion by the Carrier Division Commander: Specifically, the relationships of the agitation used in a "come ahead" signal versus the speed desired.

It was considered likely that the pilot's foresightedness in having 70 percent rpm set when the director gave him the agitated come-ahead was not the usual standard of pilot performance to which this director had become accustomed. As a result he had probably developed a habit of giving FJs and A4Ds agitated come-ahead signals out of the number 1 ready spot toward the catapult. The acceleration of this particular plane caught him by surprise.

"Therefore," said the Division Commander, "It would appear to be wise to train taxi directors toward these goals:

"Achievement of a standard pattern of plane director signals (frequency and amplitude of arm movements) for each absolute speed value desired.

"A realization that many jet engines take a prolonged time to accelerate (violent come-aheads don't reduce this time) and that an airplane normally continues to accelerate for a considerable distance after it is started into motion on deck."

It was also recommended that each squadron, with the advice of the flight deck officer, establish firm doctrine relative to power settings to be used by pilots while planes are holding position on deck awaiting an immediate come-ahead signal from the director.

As long as the pilot is at the controls, he retains responsibility for his taxiing speed, regardless of the calm or agitation of the taxi director. An agitated signal can also result in an agitated pilot, especially if he suspects that he might be getting a "hurry-up" because of some potential danger from astern.

GRIPES and SQUAWKS

SUPPOSE a buddy of yours were giving you instructions to find your way to the apartment of the beautiful doll he had gotten you a date with and all he could remember was that it was on a corner across from a grocery store. Do you think you could find the place? You'd probably give it a good try, and it might take you quite a while. By the same token a maintenance man has to have some information if he is going to repair that aircraft and its parts effectively. A simple statement like "Compass won't work" may look pretty hot to you after you have just written it down, but it won't help the electricians find out what is wrong with it.

All the useful information you can give them *before* they go out to work on it might save a lot of time and will certainly be appreciated by the maintenance personnel. The above gripe on the compass could have been amplified by: "Won't slave to inner dial, have to reset it every 5 minutes." Chances are now that the electricians will know what circuits are malfunctioning and can know exactly where to start on his work, saving considerable time and testing.

Another piece of sanskrit gibberish received recently at the dispatch desk was: "Manifold pressure creeps forward." This is a nice one. Did he mean: (1) That the throttle crept forward, (2) That the reading on the gage increased with no movement of the throttle, or (3) That both occurred. Was the friction knob tight in power? Did this happen in level flight or in a dive-bombing run? When the crew takes the aircraft out to turn it up, it's sometimes hard to simulate flight conditions. All the info they have before they start to work will help them cut time off the repair job.

Next time you gripe an aircraft be sure to include as much information as you can to help the maintenance gang. When you write it down, ask yourself if it's all you can think of that could possibly be of any help to a trouble shooter. It's also a good idea to follow up a gripe you have given an aircraft to see what the trouble actually turned out to be. Next time it happens to you, you may be halfway between the carrier and the beach above a 300-foot overcast with the air boss asking you if you can make it to the ship. The more you know about the plane, the more comfortable you feel flying it and the *less clutched* you become when something happens. — *ATU-301 "Chock Talks"*

NOTES FROM YOUR flight surgeon

Who's on 1st?

IT WAS bound to happen one day . . .

The copilot of a P2V-5F touched down in a flat three-point attitude which started a porpoise. The pilot immediately took over the controls, shouted to the copilot that he had the aircraft and applied full power for a waveoff. The copilot pulled the power off. The pilot applied the power again. This happened four times before the pilot got complete control of the throttles. Meanwhile the aircraft was going through a series of bounces, each progressively worse. Finally the pilot was able to control the plane and get it safely in the air.

But all was not over . . . After getting airborne, the copilot retracted the landing gear, then retracted flaps from full down to the 10-degree position. Immediately, the pilot placed the flaps to the 20-degree position and executed a safe wave-off. Inspection of gear disclosed one blown tire. With the field notified of the emergency and crash equipment standing by, the aircraft landed without incident.

Diagnosis: Confusion in the cockpit.

Remedy: Command relationships of the pilots *must* be clarified prior to flight in anticipation of any emergency.

Human Factor Help

HIGH on any list of helpmates for human factor problems is the flight surgeon. If there ever was a man made to order as a team-mate of the safety officer, he is it. Say what you will about strategy, tactics, combat procedures, flight techniques, checklist, SOPs . . . cranked into every plan is that urge to prolong our own earthly existence as long as possible. And that is right down the flight surgeon's alley.

Most of us are all too prone to get wrapped up in our own little ball of paperwork and never know what is going on elsewhere. How many commanding officers or aviation safety officers regularly enlist the aid of the flight doctor's services in solving various problems concerning their aircrews? Not many. Yet here is a man whose every moment of training was designed to make the human machine operate better and last longer.

One good way to get the flight surgeon into the act is to stuff him into the airplane and shove the throttles forward. Let him see and feel for himself just what your particular aircrew problems are. There have been cases wherein aircrews suffered eyestrain, excessive fatigue or headaches from flying certain aircraft. It might have been the cockpit lighting or ventilation or maybe carbon monoxide was getting in somehow. The flight surgeon is just the man to help you with such cases. Give him a chance. . . . Call in the flight surgeon occasionally and let him tell the troops just how and why the body needs the proper amounts of food, sleep and maintenance. Many times a person will resist instruction or education until he thoroughly understands the why's and wherefore's of the situation. Let the flight surgeon tell 'em—it's his job.

It is a recognized fact that repeated prolonged flights take something out of a man. Yet, it seems that sometimes crew rest and scheduling policies just don't come for an ambitious commander or operations officer who tends to push his crews just a little to meet programmed commitments. The flight surgeon can be a great help and a sobering influence if he is given a

chance to work with the flying safety officer in recommending safe and adequate crew rest policies.

1st MAW "Wing Tips"

Ejection Formula

SAFE separation of pilot and ejection components from the aircraft plus safe separation of pilot and parachute from the ejection seat plus proper opening of the parachute equals one successful ejection. But add one bailout oxygen hose looped around the shoulder harness plus one unmodified alligator clip fastened to the parachute harness or flight suit and a potentially successful ejection can be thrown for a deadly loop.

The Wrong Way: If the alligator clip is unmodified or fastened to the flight suit or parachute harness, the clip and hose can delay separation time from the ejection seat. If the parachute opens before the pilot is free of the seat the chute can entangle with the seat with fatal consequences.

The Right Way: The aircraft oxygen hose should be attached to the shoulder harness by one corner of the modified alligator clip. Modification of the clip by filing its teeth off is in accordance with Bu-Aer Clothing and Survival Equipment Bulletin 20-57 of 3 July 1957.

If you have to go and time permits, before ejection disconnect all equipment as described in the Flight Manual ejection procedures for your aircraft.

Helicopter Ditching

THE other day a report on the ditching of an HRS-3 came in. The pilot elected to ditch his aircraft when he experienced a power loss just before landing on his ship, an ARC anchored about five miles offshore. He took the wave-off because of the threat of fire on a small ship if he turned over, and the possibility of injury to observers, helo crewmen and flight quarters personnel on deck.

The pilot carried out the new techniques for helicopter ditching and states it "worked perfectly."* He landed in a flat attitude with little shock. As one blade hit the water, the entire rotor system came to a halt. The pilot, copilot and three passengers all escaped without injury and were in the water only a few minutes before being picked up.

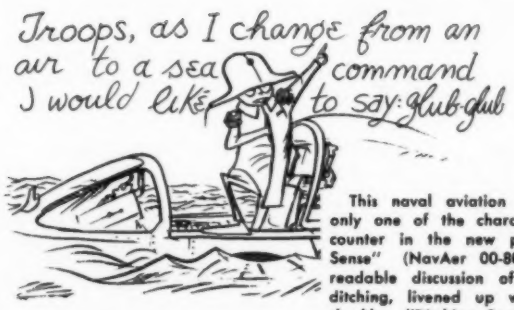
The pilot's comment is worth passing along: "I wholeheartedly encourage pilots to review ditching instructions in their type aircraft."

* For the benefit of non-helicopter personnel, the new technique is to take the helicopter straight in, level, and stop it with the rotor brake.

Be Prepared

A BOY SCOUT flashlight with a red lens is a signalling device highly recommended by an F2H-4 pilot who ditched at night. Personnel aboard the rescuing DD easily spotted the flashlight's red beam.

The same pilot who was also carrying a pistol loaded with tracers lost it while releasing his life raft from his chute pack when its short lanyard slipped off his wrist.



This naval aviation type Napoleon is only one of the characters you will encounter in the new pamphlet "Ditching Sense" (NavAer 00-80Q-50). A clear, readable discussion of the problems of ditching, livened up with a number of chuckles, "Ditching Sense" should become a naval aviation "bestseller."

Ditching

WHILE on a flying mission off the northeast coast of Spain, the pilot of an AD-6 experienced difficulty with all available navigational aids, became lost and was forced down due to a low fuel state. After searching for an airport in vain, the pilot spotted a long wide beach and decided this was the place to ditch. Once the decision was made to ditch, the pilot's outstanding performance in handling the emergency situation resulted in a good ditching with no personal injuries.

"There was no wind. I tightened my shoulder straps and undid my leg straps to my parachute. I already had a canteen and apple, a chart and survival kit in my G-suit. I dropped my flaps, went over the check-off list and aimed for a point a mile or less off shore, heading north. I made a very easy landing, touching down at 80 knots at 1910 and swerving to the right about 40 degrees. I secured my fuel and battery switches just before hitting the water. Then when the aircraft came to rest, I stood up, cleared myself, and dove into the water. The plane sank in about 50 seconds. I undid my chest straps, inflated my life vest, climbed into my rubber raft and awaited the oncoming boats."

The pilot was picked up shortly afterwards by a Spanish fishing yacht accompanied by a patrol boat.

Supply & Demand

THE safety and survival clothing situation in a recent accident involving a ZS2G-1 was a pretty sad state of affairs. Of 12 persons aboard the blimp, only 5 were using any kind of safety and survival clothing. Three crewmen wore flight shoes and pilot and copilot under instruction wore flight suits. The rest of the men were wearing khaki uniforms or dungarees and low oxfords.

(The blimp experienced rudder control failure and lost direction. Immediately after touchdown, the gear collapsed and the fuel system ruptured. Gasoline poured out underneath the car and the car filled with fumes.)

The reporting flight surgeon notes, however, that insistence on wearing proper flight gear requires a realistic appraisal of supply problems.

If it is difficult or impossible for a man to trade a dirty, oil-soaked flight suit for a clean, properly treated suit, he may resort to washing the suit at home, possibly destroying its fire-retardant properties, or he may wear dungarees instead.

When a suit gets dirty, it should be turned in to the squadron flight clothing pool for cleaning. The cost of cleaning flight clothing is properly chargeable to the operating allotment of the squadron desiring the cleaning (Vol. II, BuSandA Manual, Para 26243 and 26244). Cleaning will normally be done commercially. However, because of the fire retardant qualities required in these flight suits, cleaning should be done in accordance with BuAer Clothing and Survival Bul. 38-57 of 18 Oct '57.

If the flight suit has a label in it which says "Launder by Formula S," it can be washed in soap and water without damage to the fire retardant qualities. Flight suits so labelled have been finished with a durable fire retardant. (Formula S is ordinary laundry soap as set forth on page 42 of the Ship's Store Laundry Handbook, BuSandA, 1 Nov 46.)

Rescue Knife

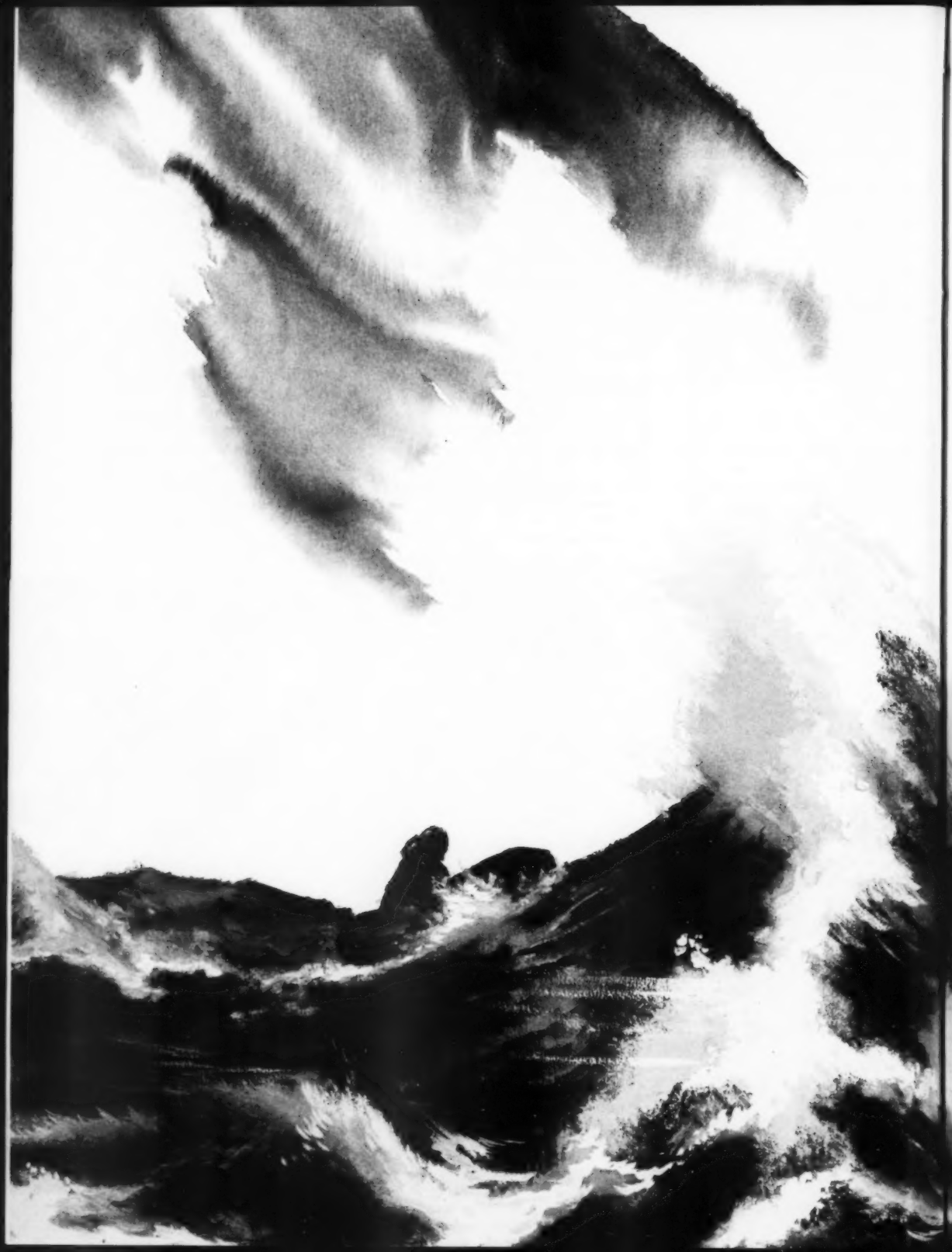
DURING an approach to landing, the right wing of an FJ-4B stalled and the aircraft settled in short, the nosegear and starboard gear sheared on impact. As the aircraft stopped moving, it burst into flames.

Instead of jettisoning the canopy, the pilot opened it in the normal fashion. He remembers going through the motions of unbuckling his parachute straps, getting up and trying to jump out of the right side of the aircraft. However, the left chute leg strap was not unbuckled, and as he tried to jump, his left leg became caught in the leg strap just above the knee.

When the crash crew arrived, the firemen found the pilot struggling over the right side of the plane—head down with his foot caught. The intense fire ignited the firemen's "hot suits" and they were forced out of the flames. As the fire truck controlled the flames with foam and water, two more firemen went to the pilot's aid. They used the new V-shaped rescue knife (see photo) to cut the straps and free the pilot.

"This knife is vastly superior to any other kind in use," the reporting flight surgeon states. "It should be in wide use throughout the fleet."

The knife is a standard stock item, Federal Stock No. RN-7340-524-6924-S231 (V-blade knife and one blade). Additional blades can be ordered under Federal Stock No. RN-5110-068-4326-S231. Don't forget to include a complete justification for these items.



SEARCH DISCONTINUED

FLIGHT operations above the carrier were proceeding routinely on a day in June in the Mediterranean.

A two-plane combat air patrol was taking part in a NATO exercise involving foreign aircraft. Vectored for an intercept of two friendlies, the section leader in an F9F-8B observed a pair of F9F-8's close ahead at about 28,000 feet. He began a steep right turn to come around behind them. Suddenly a NATO fighter appeared in his path. . .

Mid-air collision.

"A ball of fire," one witness described it. Another said it was "exactly like a 5-inch shellburst."

Immediately following the explosion, a parachute with alternating red and white panels was seen opening. As it descended to the water, the NATO pilot showed no signs of life. No one saw the American pilot.

Although three eyewitnesses of the mid-air collision were positive there could have been no survivors, the American pilot did survive.

As the two aircraft collided, the American pilot was jolted by the crash which ripped his cockpit canopy away. The next thing he was aware of was the sky in his face as his oxygen mask and helmet and his life vest flashlight were torn off by the blast. Above him he saw the face curtain handle, reached for it and pulled it. He was immediately ejected.

During his five-mile descent to the water, he breathed oxygen by mouth from the tube on his bailout bottle.

The pilot was equipped with an automatic lap belt release but did not have an automatic parachute opener. He free-fell for almost 27,000 feet in a head-down position. At an altitude of 1500 feet, he finally pulled his chute ripcord. The chute opened at 1200 feet and he was swung feet down

Continued from preceding page

under the canopy. As the investigating flight surgeon later wryly commented in his report on the accident, to freefall to such a low altitude before actuating your chute is "not the way to live to be 90."

Releasing his leg and chest snaps and retaining his chute by crossing his arms to hold the harness in the descent, the pilot hit the water head up, feet first, opened his arms and fell free of the chute. The chute pack was still attached by the lanyard to his Mk II life vest.

A strong wind billowed the chute, dragging the pilot through the water by the liferaft lanyard. He went under several times before he was able to spill the air from the canopy by pulling on the top shrouds. As the chute suddenly collapsed, his feet became entangled in the shroud lines.

After inflating his mae west, the pilot broke out his pararaft and inflated it. He was still unable to free his legs from the shroud lines.

At this point, the pilot committed what he later realized was an "almost fatal error." In his desperation to get into the raft, he pulled his sheath knife from its scabbard on the left leg of his summer flight suit and cut through the tangled shroud lines. He then climbed into the raft.

About a half-hour later, he realized that along with the snarled shroud lines he had cut loose his PK-2 survival kit containing both seawater desalting chemicals and solar still. Among the other items in the kit were two packets of dye marker, a signalling mirror, a poncho, one can of rations, a corner reflector and two distress flares. All that he had left was his knife, the equipment on his Mk II life vest minus the flashlight, and his two-piece personal survival kit, the PSK-2.

Meanwhile, although witnesses felt that no one could have survived the mid-air collision, an extensive search of the collision area had begun. AD aircraft began to search upwind from the point at which the NATO parachute had landed, through the area where the collision had occurred. Shortly afterwards, a squadron of destroyers began a line-abreast sweep of the same area. The wind at this time was 30 to 35 knots and the sea condition was rough with whitecaps.

The mid-air collision had taken place in the late afternoon. That evening, the pilot saw two AD's flying at about 1500 feet in a good position to see him on his life raft. He fired one of his day-smoke signals; it functioned well but did not attract attention. The night portion of this flare did not work.

When he saw two more searching aircraft, he fired the night portion of his second and last flare. It was brilliant but went unseen. The day portion of this flare did not work.

Several times he used his dye marker but with no success.

That same night, the pilot saw the lights of several merchant ships. Later, he spotted about 10 mast-top lights and realized that this was a destroyer line searching for him. Passing close to two of the destroyers, he blew wildly on his whistle—his only means of signalling left—but was unable to attract attention.

Around dawn the next morning, the pilot saw the destroyers returning. This time he passed outboard of the flanking destroyers so close that from the crests of the waves he could make out figures on the deck. Again he blew his whistle, waved frantically and released dye marker but he could not attract their attention.

He saw more planes later in the morning—two AJ's headed east, a P2V in the distance and a NATO twin-float seaplane. The seaplane turned from its course directly toward him and for a few joyful minutes he thought he had been spotted. However, the plane flew right over him and continued in a westerly direction. It became smaller and smaller until finally it disappeared into the distance.

That afternoon, the aircraft and destroyer search was called off as hopeless.

During the day, the winds and seas increased. Although the sea and air were warm, the wind blowing on the pilot's wet clothes kept him constantly chilled. Shivering continuously, he pulled the raft's covers up like a tent and huddled beneath them.

The wind was high and the sea was rough on his second night on the raft. During that night and the following day, the raft overturned five times. Each time, the pilot had to unsnap the PK-2 retaining lanyard to get back into the raft, then resnap it.

On the afternoon of the third day, the pilot sighted a flight of ADs going from south to north at a low altitude. He put dye marker in the water but again was not seen.

Desperately thirsty by this time, he thought first of the solar still and desalting chemicals in the survival kit he had cut loose and then of the bottle of ice water his wife always kept in the refrigerator back home in the States.

During the day he managed to fish a bottle of liquid out of the sea but it turned out to contain vinegar. Except for the two chocolate bars in

his personal survival kit, the closest he came to food was when he passed a few rotten apples bobbing in the water.

The raft overturned several times that day but by night the seas and winds had calmed considerably.

By this time, the pilot had given up all hope of being picked up and began to wonder what he could do to help himself. Getting to land, he decided, was his only chance but which way was land?

The morning of the fourth day, shortly after light, two peaks of an island appeared on the southern horizon. A bit later he saw an island to the east which he could identify as Stromboli.

Referring to his wet but still legible WAC chart, the pilot identified the southern island as Salina; he estimated its distance as about 15 miles. Knowing his survival depended on his getting to this island, he determined to paddle to it if it took him all day and all night.

Paddling steadily as possible for an hour at a time without measuring his progress, he managed to make headway by the day's end. At sunset, he could make out what looked like houses on the hillside. After dark, village lights were visible although dim. Using the lights for direction, he paddled toward the island.

At about 0200, he was within 100 yards of the shore but was so exhausted that he could not continue. He passed out in the raft. When he regained consciousness, with great effort he climbed up onto a breakwater and pulled the raft behind him. The time was approximately 0300.

When he tried to stand, his legs were too weak to support him and he fell on his face. Stumbling and falling, he struggled to the foot of the hill only to find all the houses empty. With great difficulty, he climbed the hill until he found an occupied house. He pounded on the door and called for water, then collapsed in the courtyard. The people in the cottage thought he was drunk and, at first, would not open the door to help him.

After a short time, the householders' suspicions quieted and they came out to investigate. They brought the exhausted pilot some water, then took him inside the house. After giving him dry clothes, they put him to bed and summoned the village doctor. The pilot later stated that, in spite of the time of year, this was the first time he had been warm in three-and-a-half days.

. . . Three-and-a-half days.

What had been happening during this time at the pilot's home back in the States?

After the unsuccessful search had been called off and a memorial service conducted aboard the carrier, a second memorial service was scheduled at the pilot's home base. Relatives, former Naval Academy classmates and friends gathered from all over the country to be with the pilot's "widow" and her two young daughters.

On Salina, the village doctor had notified local authorities who in turn sent word of the pilot's survival to Naples and the U.S. Navy. A destroyer picked him up at the island the next day and returned him to the carrier. Meanwhile, the miraculous news had been speeded to the States in time to cancel the memorial service.

Practice Makes Perfect

As a result of a number of rescue incidents, an instruction went out from one fleet commander on the subject of search:

"A recent fatal accident during night carrier operations brings home again the urgent necessity for making fullest use of all our facilities and capabilites to save the lives of pilots in distress. No one can place a value on human life and our Navy has always gone full out where men are in jeopardy. But even on the side of the almighty dollar there are most compelling and hardheaded reasons for such action. Considering the flying skill alone, we know that it costs many thousands of dollars to qualify a man to sit in the pilot's seat of a modern plane. It also costs a lot of time by many men and machines, which can be even more critical investment.

"Under normal daylight conditions, we have been doing all right in bringing them back safely. However, at night and when the weather is bad, we have not been doing as well and it is imperative that we do better.

"In light of the above, each commanding officer is enjoined to personally reevaluate the contribution that his ship can and will make toward overall ——— fleet air-sea rescue readiness. In directing his efforts, it would appear that the first steps should include improvement in: 1) visual acuity by alert, well-trained, properly equipped and highly motivated lookout and topside watch teams. Gun, director and bridge crews can all see and each man on this team must be sharp. 2) routine tracking of each aircraft within radar range. A significant "bonus effect" of such a program would be a marked improvement in our air defense readiness through better trained radar operators. 3) SAR techniques and facilities available to assist the airman in distress. Detailed instructions must be issued to those who may be called on to use them. Drill to develop skill should be carried out so rescue teams do not do their first practice on live subjects."

'Passing through

Can you tell at a glance the different altitudes indicated by the settings on these four altimeters?

Be sure to check your readings against the correct answers in the box, upper right, next page.

Note: *Barometric settings are not visible in these photos as readings were hand set for photographic purposes. Under normal conditions barometric settings would be visible.*

A

B

gh 12,000...'

A — 2,000 feet
B — 12,000 feet
C — 22,000 feet
D — 32,000 feet

APPROACH in March 1958 published an article "You Can Be Wrong By 10,000 Feet" covering the possible errors that could be introduced into the altimeter by flight and maintenance personnel. A review of reports received at the Safety Center has revealed several instances of misread and possible erroneously set altimeters.

A recent F8U accident (fatal) involved a misread or erroneously set altimeter. The pilot struck an elevation of 2300 feet in a level attitude after being cleared to 8000'. He reported passing 12,000' when contact was lost on GCA, indicating a possible 10,000' error in reading or setting.

An Air Force accident review received at the Safety Center revealed a 10,000' setting error as the probable cause of a light bomber accident and is also suspected to be the cause of two other accidents during the past year.

A study of photos (next page) received with a recent F9F-8T wheels-up emergency landing report reveals altimeters in both cockpits to be indicating a difference of exactly 15,000'; front, 15,200—rear, 200. Although these settings did not have any bearing on the accident it is believed that a possible error existed prior to takeoff as both panel assemblies showed no visible damage to altimeters or other instruments.

Several reports are on record of aborted takeoffs due to no airspeed indication. A number of landings have also been reported which required a pace plane because of this. Cause: Reverse connections by maintenance personnel indicating a functional check after installation was not performed.

It is believed that a review of the article in the March issue of APPROACH by all pilots and maintenance personnel will go far in eliminating this type of error and its disastrous results. A review of Squadron Safety reports received at the Safety Center shows that many activities are making an all out effort to bring home the altimeter setting

C

D

Continued from preceding page

and reading problem to their pilots. Excerpts from some of these are:

(a) Altimeter Errors: ATAKRON 63—"Although we are in sunny California the weather at this time of the year is still pretty cold. For every 5° difference from standard temperature a 1 percent error in indicated altitude occurs. Low temperatures cause aircraft to be lower than indicated altitude. Lest we forget, this could plant you and your trusty aircraft into some cold hilltop, unless you remember to put the correct altimeter setting into altimeter before commencing an instrument approach."

(b) An Air Wing's review of November accidents included a fatal/strike accident due to a misread altimeter—Result: Collision with ground on a jet penetration.

(c) A Safety Officer cautioned pilots flying in the Naples area to be on the alert when receiving altimeter settings as some stations may give the "QFE" instead of the "QNH" setting . A "QFE" setting will indicate a reading of ZERO on the runway instead of field elevation as given by a "QNH" setting. (Ref. USAF special notice C14 dtg 191515Z Mar 1958).

Maintenance personnel can help eliminate this type of error by:

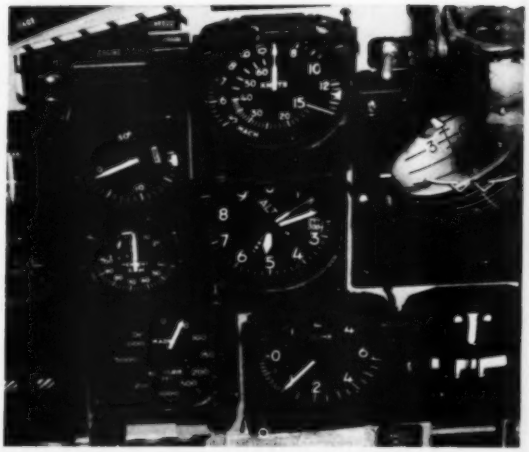
Noting altimeter settings and pointer positions on pre-flights and if any doubt should exist call the pilot's attention to it to eliminate any possible departures with unsafe indications.

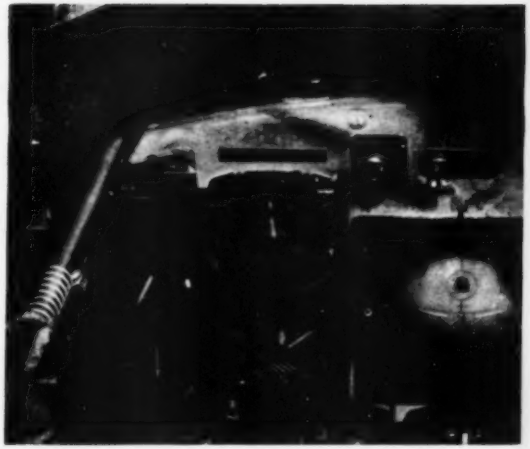
Insuring all static vent drain caps are secured, and lines properly checked for moisture and a possible icing hazard during flight.

Insure security of all lines in cockpits to eliminate erroneous indications due to pressurization system pressure leaking into altimeter-air-speed and rate of climb systems nullifying static pressures from outside the aircraft.

On periodic maintenance conduct a thorough functional check of the pitot-static system in accordance with Aircraft Instrument Bulletins 29-46, 12-53, 29-47 and existing Command instructions. Keep in mind it is mandatory to functionally check the reinstallation of any pitot-static system instrument removed for bench test or replacement. This will eliminate the possibility of reverse connections as pitot pressure to static connection and static pressure connected to pitot connection.

In short, maintenance personnel should realize that pilots are trained and are capable of handling emergency situations, but weather and other adverse conditions may distract his attention. Therefore we must not allow him to be a potential statistic with two strikes on him before he leaves the flight line.

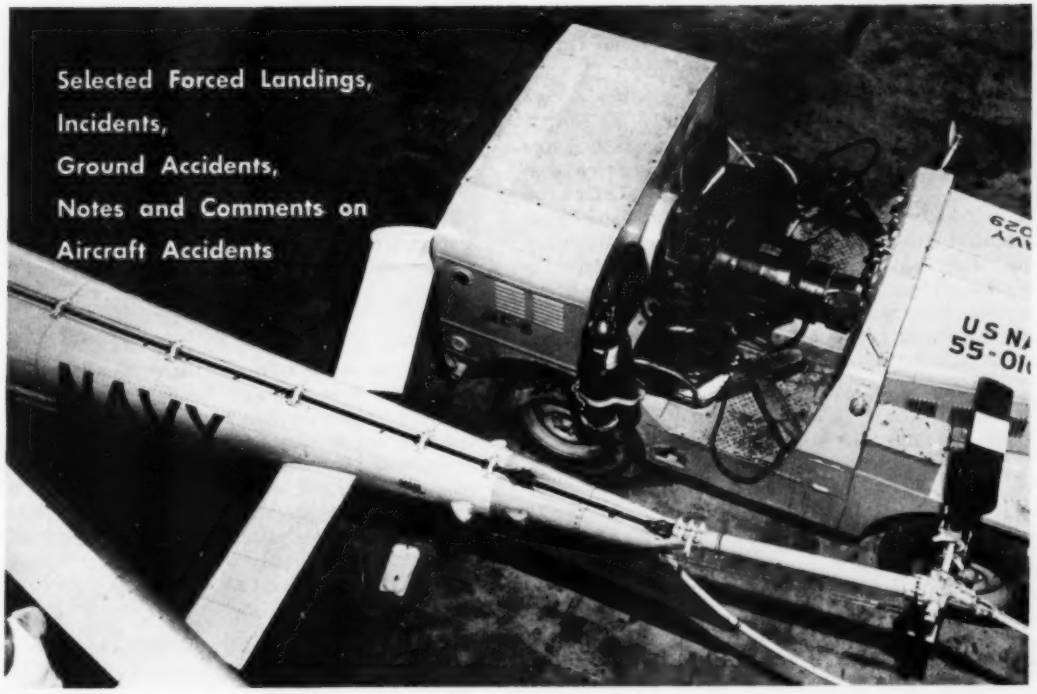




Case in point — A difference of 15,000 feet was found between these altimeters of one aircraft. Front cockpit instrument, top photo, reads 15,200' — rear cockpit instrument, lower photo, 200' — Details are on previous page.

A careful check for altimeter setting errors prior to leaving the line and a program of ready-room study are positive steps to assure accurate reading of these instruments at a glance. In the future let us all pay an extra amount of attention to one of the oldest and most required flight instruments. •

FROM THE GROUND UP



The Flight Deck Bos'n Reports

IN THE first quarter of this fiscal year there were 213 ground accidents. This is an increase of 29 over last quarter, and if we continue at this rate for the remainder of fiscal 1959, we can expect 13 ground accidents *per month* over fiscal 1958. Only by making personnel aware of safety methods and the need for precaution can this be avoided.

Involved in the 74 vehicle-aircraft collisions occurring during this quarter were 6 gas trucks, 17 starting units, 16 tractors with no intent to tow, 13 fork lifts, and 22 jeeps, trucks, ...

Portable equipment such as ladders, stands, chocks and tie-downs accounted for 19 incidents of which 16 were the direct cause of improper securing and chocking of aircraft. This points up the necessity for closer inspection of hangar deck, flight deck, and flight lines for proper securing of aircraft and equipment.

Movement of aircraft by motor tow or handling crews accounted for 94 incidents, 55 were caused by handling crews, while motor tow accounted for 39. The complexities of shipboard operation, which are further hampered by the roll and turns of the ship, normally require experienced rated directors on flight deck and hangar deck.

Miscellaneous causes contributed to 26 incidents. Among these were such incidents as elevators being lowered with aircraft partially spotted on them and two cases of hangar deck fire doors being closed on the wings of aircraft.

Fifty-five percent of the accidents involved nonrated personnel while the largest number occurred during the period from 1400 to 1600. It is also noted that about 47 percent of the accidents occurred aboard ship.

Please turn page

Continued from preceding page

LIGHTWEIGHT SELF LOCKING NUT USAGE—Because of a number of instances of lightweight self-locking nuts working loose, one aircraft manufacturer is adopting some design changes to improve the security of the flight control system and other vital mechanisms. Castle nuts and cotter pins, rather than self-locking nuts, will be used in all single-bolt connections in the flight control system, and in every other application where loss of a single bolt could cause loss of the airplane.

As an additional safeguard, the manufacturer is altering installation practices to require that the chamfer and two full threads protrude through all self-locking nuts. This is because the locking feature of the light weight nuts is the "pinch" or flattening in the last few threads. Since two imperfect threads are allowable on AN bolts and screws, it is possible that some bolts will not be gripped tightly enough if only the chamfer protrudes through the nut.

Another thing which contributes to loosening of the self-locking nuts is wear of the bolt threads after a number of re-installations. The nuts are very hard (180,000 PSI heat treated) and AN bolts and screws are only 125,000 PSI. For this reason the manufacturer is adopting the practice of discarding all AN bolts and screws after one installation.

The manufacturer states — these changes are going into production as soon as possible without delaying the delivery schedule. These are improvement changes, and at present there are no plans to make them retroactive. However, if trouble with loosening nuts is encountered in service aircraft, it would be a good idea to follow these practices in the trouble areas. Also, when making repairs or replacing bolts, the new practices can be conveniently adopted and will help to prevent future difficulites.

HYDRAULIC O-RINGS—IF YOU SEE RED—Marine Air Group 15 dispatch 190222Z Sep 1958 reports a loss of brakes on an aircraft due to a brick red-colored hydraulic O-ring seal which had swollen and ruptured. Further investigation of their aircraft revealed similar seals in various states of failure. The wrong type of seals had been inadvertently issued for use.

BuAer Comment: Hydraulic O-rings are always black in basic color. Investigation revealed red seals had been mislabeled with the wrong federal stock number. Units to which these O-rings have been issued are cautioned against the use of red O-rings.

EXTINGUISHANT FOR METAL FIRES—An unexpected outgrowth of one of the Navy's fuel programs has been the application of a new boron chemical, trimethoxyboroxine, liquid, for the control and extinguishment of magnesium fires in aircraft. Discovered and developed by a research team in the Chemistry Division of NRL, the new nontoxic agent has been placed in use at over 200 naval air stations around the globe by the Bureau of Aeronautics.

By spraying this chemical liquid (called "TMB" by the industry) on the brilliant white fire of burning magnesium airframes and parts, naval fire fighters can now for the first time extinguish these fires without fear of explosions and flying hot metal. The stream of syrupy liquid works by decomposing in the fire to a molten sticky mass of boron oxide which coats the burning metal, excluding oxygen and halting further ignition. Cooling water and foam are then applied, and the metal fire is out.

Several dramatic rescues of men in burning aircraft have been made through its use in the past year. One was at NAS, Cherry Point, N. C., where a helicopter fire was fully extinguished and the four occupants of the plane rescued by expeditious use of TMB extinguishers and foam. Recent tests by the Atomic Energy Commission, in which the NRL extinguishing liquid was used on titanium, zirconium, and uranium metal fires, have shown that TMB is the only available agent that extinguishes these fires successfully.

FUEL CELL STORAGE—During the investigation of a recent accident, the occasion arose to look into the fuel cell preservation procedures used by an airframe manufacturer when inducting aircraft into a modification program. Considerable misinformation and doubt as to the proper procedures was apparent. On the basis of this finding, the fuel cell preservation procedures at a large O&R were surveyed. Again considerable confusion seemed to exist.

Lack of proper fuel cell preservation procedures can result in drying and cracking of the cell lining, ultimately causing serious fuel system difficulties. Fuel cell deterioration *has* been a major factor in many aircraft accidents. Because of this, all activities having custody of empty fuel cells, either in storage or in grounded aircraft, must follow the procedures listed in the following publications:

- Handbook of Maintenance Instructions
- NAVAER 03-10-513: Maintenance Instructions on Self-Sealing and Bladder Type Fuel Cells, 1 January 1950. Page 9, Section IV, Paragraph 3.b

Damaged holdback fitting occurred as FJ-3 moved backwards over holdback pendant.

NOSE LIGHT—An FJ-3 was being positioned for a port catapult launch. The aircraft was initially positioned outside of the acceptable position so it was moved aft and the holdback assembly was disconnected. The director brought the aircraft forward again into an unacceptable position.

The aircraft was moved aft again. The holdback men were unable to disengage the pendant on this second movement and the aircraft was damaged.

Statement of Taxi Director: I was spotting the port catapult and taxiied FJ-3 onto the catapult. The plane was not lined up properly, so I had the crews push it back. In the course of pushing it back I lost sight of the holdback man, I pushed the plane too far aft resulting in damage to the hold back.

This is the second accident of this type that this command has experienced.

The FJ-3 aircraft is very "nose light" when it is being moved aft by flight deck personnel pushing on the wings and directional control is difficult to maintain by steering the nose wheel with a tiller bar. The catapult holdback pendant is difficult to remove from the assembly unless the aircraft moves straight back. As a result of these two factors the director and the holdback man must work together in this movement. The noise level in the vicinity of the catapults is extremely high so the director must position himself so that he can see the holdback man's visual signals. He must then cause the aircraft to be moved aft very slowly until the holdback is disconnected.

It is recommended that supervisory personnel on the flight deck do not allow directors to rush the respot of the FJ aircraft on the catapult. Respotting must be carefully performed. It is further recommended that the director take a position 5 to 10 feet outboard of the wingtip of the aircraft while disengaging to holdback pendant. Pilots should not release their brakes until the director is in this position.

Pilots were instructed to hold their brakes until the plane pushers are evenly distributed on both wings of the aircraft and until the plane director moves to a position where he can safely observe the aircraft movement.

RIGGING DEFINED—The definition of proper rigging with regard to maintenance inspections: It is an all inclusive term meaning that all parts are not only properly routed and connected, but are not binding, chafing or worn.—*FAir San Diego*

JUMPER WIRE TABOO IN F8U—BuAer Dispatch P122210Z of Dec 1957 and BAR, Dallas Dispatch 092225Z of Dec 1957 presented the possible safety of flight problem involved with the use of a jumper wire in the wheel-well plug on the Models F8U-1 and F8U-1P aircraft. Recent reports indicate that certain squadron activities are still using these jumper wires despite the cautioning dispatches, the Handbook of Maintenance Instruction and the recommendations of Chance Vought Field Service.

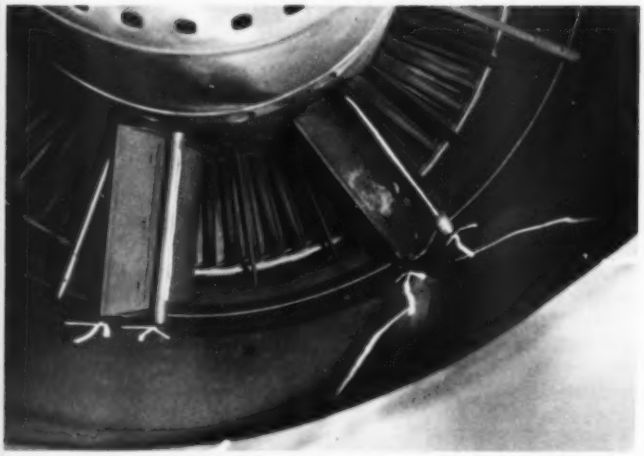
Problems resulting from this jumper wire are twofold:

(1) Should the jumper be left in the aircraft airstarts would be improbable because of the excessive load on the emergency ram air turbine.

(2) Use of the jumper permits starts with the engine master switch off. This results in the main fuel shut-off valve remaining closed, cavitation of the engine-driven fuel pump and subsequent fuel control filter contamination from foreign particles generated during the process.

Jumper wires are being used in some squadrons because some GTC 85 and GTE 85 gas turbine starter units are not compatible with the safety circuit incorporated in the starting system. Additionally, jumper wires are being used because of the poor reliability of the speed opening switch of the Bendix starter unit.

Continued from preceding page



Hot streaks resulting from incorrectly installed exhaust strut weldment caused damage to front duct and inner liner of J-57 jet engine.

Occurrence: J-57

Reports have been received of three instances on the J-57-P-8 Engine found with misaligned exhaust strut weldment (see photo above).

These weldments did not have turbine exhaust strut locating rod weldment PN 273325 inserted through the exhaust rod vane resulting in after burner front duct and inner liner damage by hot streaks in the exhaust gas flow.

Corrective Action:

See the Handbook of Service Instructions 02B-10ADC-502 Rev. 3-15-58 Sec. IV para 387 referring to this installation.

Occurrence: F8U

An F8U received strike damage, the pilot, fatal injury. Aircraft was 2000 feet on the downwind leg of GCA pattern at NAS when there was an apparent loss of thrust. The wingman did not receive an answer to his radio transmission. The aircraft incorporated the latest changes in single-point ejection with automatic parachute features. These features had probably been bypassed by the pilot to speed deployment of the parachute. The ejection was unsuccessful.

Cause:

Pieces of a *spare* O-ring were found in the fuel control.

Corrective Action:

Inspection.

Program Payoff

The staff maintenance officer discussed the foreign object damage prevention program and its beneficial results, noting that the incidence of engine changes from foreign object damage has dropped appreciably since the inception of the program.—NATechTraCom

Occurrence: AD-5N

Engine started to vibrate and run roughly approaching cut position for landing. The engine smoothed out when takeoff power was applied, then cut out momentarily 3 times when power was retarded on downwind leg. The pilot maintained power by using primer, notified LSO, and landed.

Cause:

Sparkplug in No. 14 cylinder had been cross-threaded upon installation; after 68 hours flying time, plug came loose and was blown out of cylinder.

Corrective Action:

Re-emphasize that threaded fittings must be hand-tightened and determined to be fully seated before using wrench.

Attempting to remove the tire from wheel before deflating the tire resulted in serious injury to the mechanic.

Occurrence: HRS-3

Without relieving the air pressure, the mechanic attempted to remove a tire from the split wheel assembly off the main landing gear of an HRS-3. After turning the bolts to the nearly unscrewed position the outboard section of the split assembly failed striking the mechanic and causing a compound fracture of the right arm and cuts to his left arm and chest.

Direction for removal of the tire printed on the wheel assembly state that the tire should be de-

flated before removing. The pressure was sufficient to force the two sections of the assembly apart.

Four days before this accident occured, the injured man attended a safety lecture that pointed out the necessity of removing valve cores prior to disassembling tires from wheels. After the accident occurred the injured man stated, "I thought the air had been removed from the tire."

An improperly threaded shackle pin which worked loose resulted in a runaway A4D during turn-up.

Occurrence: A4D-1

While the A4D-1 was being turned up at full power by a maintenance crew, it jumped a chock, broke free of the tiedown gear, and collided with a Boeing GTC starting unit parked approximately 35 feet away. The aircraft came to a stop after the starboard main landing gear door punctured a fuel tank on the GTC.

The accident was caused by failure of the shackle which attached the tie-down gear to a padeye. A mechanic inspected the tie-down on the cables before the chocks were inserted and the shackle pin was reported in place and secure.

Inspection of the shackle (see photo above) reveals only one thread stripped from the shackle and no damage to the pin beyond the flattening of threads on one side. It appears that the pin damage resulted from friction of the padeye link sliding off the pin after the shackle had failed. The single stripped thread of the shackle indicates that the pin may not have been inserted any further than approximately 1/16 inch, which could explain the failure. A flashlight was not utilized when securing the aircraft, although it was dark in the turn-up area.

A contributing factor was the fact that the throttle friction lock was locked so tightly that it had to be loosened before the throttle could be retarded. *This is easily accomplished with the sensitive friction lock installed in the A4D-1 aircraft.*

After the tie-down gear failed, the one chock remaining on one wheel and the brakes failed to hold the aircraft. This aircraft has sufficient thrust at 100 percent to overcome near maximum braking.

Corrective Action:

Maintenance crews were rebriefed concerning the necessity of thorough tie-downs for full power turn-ups with particular attention to night hazards. The use of lighting equipment, particularly flashlights, is being emphasized to night crews.

Occurrence: HUP-2

After engine warm-up was completed on a HUP-2 and clearance received from ship to engage rotors the pilot signalled the handling crew to remove all blade boots. After all but one of the boots were removed the pilot released the rotor brake to allow the plane director to "walk the blades through" in compliance with current operating procedures. The rotors immediately engaged before the remaining blade boot could be untied causing strain on the tied down blade to receive overhaul damage.

The friction selector switch was in the ON position when the rotor brake was released. This closed circuit breaker completing friction clutch circuit and engaging rotors. Friction selector switch position should have been noted in prestarting check.

Corrective Action:

Procedures have been changed to insure (1) that six men are available to remove boots; (2) that all boot securing lines are untied prior to release of rotor brake.

TO A JET MECHANIC . . .

One of the marks of a good turbojet engine mechanic is the sound judgment he uses in caring for his tools. He prolongs their life and increases his own efficiency and the quality of his work by keeping his toolbox organized. He uses each tool only for the purpose intended.

His check list looks like this:

1. Keep tools as clean as possible when using them, and be sure to clean them before putting them away.
2. Have a place for each tool.
3. Keep every tool in excellent condition.
4. Make an inventory of tools after each job to prevent leaving anything in the engines, ducts, wells, etc.
5. Keep junk and unnecessary tools out of box.
6. Keep tool box securely locked and in a safe place when not in use.

Can you check all six?

How to Prevent

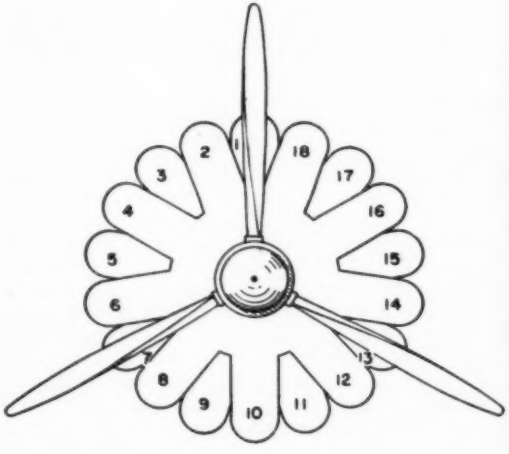
LIQUID LOCK

During start watch the prop carefully for hesitation or stoppage.

EIGHTY-SIX engine failures directly attributed to articulating rod failures occurred in R3350 engines from 1 January 1957 to 1 July 1958. Thirteen percent of these failures resulted in accidents and forced landings. There were 21 failures on new engines and 65 on overhauled engines. The average accumulated time of the affected engines was 341 hours.

Hydraulic lock was listed on the disassembly and inspection reports as the cause of nearly 55 percent of the rod failures. Moreover, study of the DIR's revealed that 53 of the 86 failures occurred in the number 10, 11, 12, 13 and 14 cylinders. The location (lower cylinders) of the failed rods, which are undetermined or still under investigation, indicates that a large percentage of these could very probably be attributed to hydraulic lock.

Evidence of this nature can not be ignored by pilots and maintenance personnel who are to operate these model engines. A thorough understanding of how hydraulic lock occurs and what it can



Disassembly and Inspection Reports of R3350 engines reveal a high percentage involving hydraulicked articulating rods in cylinder numbers 10, 11, 12, 13 and 14.

do is absolutely necessary in order to eliminate these failures.

The four ways hydraulic lock can occur are:

(1) Excessive and/or residual fuel in the cylinder and induction system.

(2) Excessive lubrication oil in cylinders.

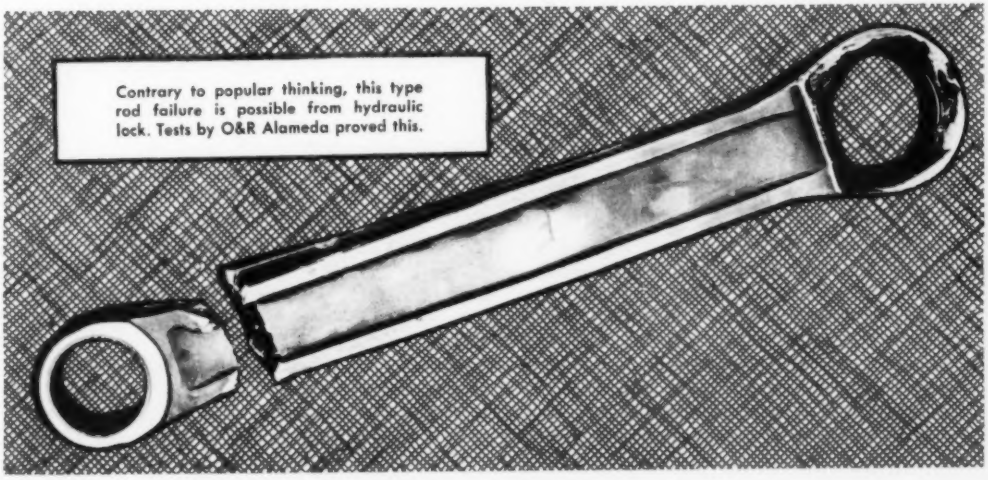
(3) Preservation oil in cylinders and induction system.

(4) Water entering into the exhaust stacks.

Hydraulic lock occurs when someone attempts to compress these liquids. Liquid collecting in the combustion chambers of the lower cylinders furnishes the ideal situation for hydraulic lock. Something has to give under these conditions and, since liquids can not be compressed, the articulating rod takes the brunt of the force.

Excessive fuel in the cylinders and induction system is believed to be the most common cause of the reported failures. This is particularly applicable to engines using spinner injection type fuel induction. This happens during starting when improper technique is used. There is no reason to start an injection carburetor engine with the mixture in any position but idle cutoff.

To refresh any forgetful operators the recommended and only safe procedure follows: Using the starter, crank the engine through without permitting any fuel to enter the engine (the continuous flow of air will clean the intake lines and cylinders of any residual fuel). Then turn on the fuel and start the engine, injecting fuel with the primer *only*. DO NOT ATTEMPT TO START WITH THE MIXTURE CONTROL IN ANY POSITION OTHER THAN IDLE CUTOFF! The primer will



Contrary to popular thinking, this type rod failure is possible from hydraulic lock. Tests by O&R Alameda proved this.

Continued from preceding page

keep the engine running all day long if necessary. After the engine is running smoothly on primer, then, *and only then* smoothly advance the mixture control to rich. Use of the primer should now be discontinued and a successful correct start will have been accomplished. If, because of a too early advance of the mixture control or inadequate priming, the engine should fail to run, immediately move the mixture control to idle cutoff and then repeat the starting procedure, *including* clearing out the induction system. Residual fuel in the impeller section can cause hydraulic lock or backfire during the next starting cycle. For you scoffers who say "this is old hat; everyone knows this," go out to your line when a hop is going out and observe. Your education will be broadened. An item to remember while you are listening is that the articulating rod failure could happen to you—as a result of someone else's error.

However, let's don't get too morose yet; there is more. Hydraulic lock caused by excessive lubricating oil in the cylinders rates a close second to fuel lock. The lad who tries a quick start is the offender here. He doesn't remove the residual oil that has collected in the cylinders since the last running period, and again tries to compress an incompressible liquid with jarring results. The sound practice of turning the propeller through at least four revolutions (16 blades on a 4 bladed prop) with the ignition and fuel OFF is practically a sure bet to prevent oil locks. In addition scavenging the engine after flight is a sound operator practice. A two-minute scavenge period in the idle range is strongly recommended. A couple of minutes longer starting and a couple of minutes longer stopping could save a lot of time tramping in the brush or swimming in the briny.

A third type of hydraulic lock occurs generally in the first few operating hours. This is caused by preservation oil being left in the cylinder and induction system and may be called depreservation lock for lack of a better handle. This is a maintenance problem generally and is mentioned here to alert operators to the problem. Pilots generally get the kind of maintenance that they insist on and here is an area that is every bit as important as correct carburetor settings or any other maintenance procedure. Mutilated engines that failed because of articulating rod failures in the first 24 hours of operation normally remain undetermined in cause. It is highly probable that the majority of these failures were caused by improper depreservation. On newly installed engines the depreservation instructions contained in the applicable handbooks must be followed. As promulgated in GREB 79 (Rev. A), depreservation valves, ("blow out plugs") are to be used prior to and during the initial ground turn-up of the engine. A complete depreservation and a thorough preoiling will go a long way toward increasing the life of the engine and the lives of the operators.

The fourth possibility is one that can and has happened but is not normally thought of—water lock. Water locks can occur from water entering into the stacks on the wash rack or during heavy rains where the water blows up into the stacks and then into the cylinders through open valves. This has occurred in the T28, involving No. 4 cylinder, particularly. Insure that stack covers are properly installed on the wash racks and when possible prior to heavy rains.

There are two types of articulating rod failures. One results from a partial hydraulic lock which bends the rod slightly. The piston stays well within the cylinder and will continue to operate. Rod failure from this partial lock will occur sometime later and is particularly dangerous and insidious for this reason. The second type of failure results from a complete hydraulic lock which bends the rod sufficiently to permit the piston to move entirely out of the cylinder and really bangs things up, with the piston often actually striking the cylinder wall. Engine failure of course occurs immediately. This is what happens in flight when one of those slightly hydraulic lock damaged rods finally is too tired and fatigued to keep pulling the load. This can occur a few (or many) piston miles after the initial damage.

"To keep 'em flying" follow these recommendations:

► Ensure that the supercharger drain valves, and cylinder or intake pipe drains are open and operating correctly to drain excess fuel.

► Before pre-oil, ensure that one spark plug is removed from each lower cylinder. Great care must be exercised in the removal of anti-corrosion oil from combustion chambers, intake pipes, and the blower section prior to the first start of newly installed engines.

► Ensure that proper starting technique is employed and that mixture control is not moved until the engine is firing smoothly on the prime.

► If an engine fails to start within 30 seconds, let the starter cool and then repeat the starting procedure from the beginning, i.e., turn the propeller through at least four revolutions with the engine starter, to clear the intake pipes and combustion chambers of fuel.

► Never introduce fuel into the intake system unless the engine crankshaft is being rotated with the starter.

► Recognize partial liquid lock and treat it accordingly with the realization that a partial lock may be the cause of a complete failure in the future. •

MURPHY'S LAW

If an aircraft part
can be installed
incorrectly,
someone will install it
that way

Reversed Wiring

AFTER contractor repair, the F2H-3 systems were being actuated. With wingfold switch in the fold position, circuit breaker pulled, external hydraulic was applied to check for leaks. When circuit breaker was depressed the starboard wing fell causing damage to wing center section ribs stations B L—57.00, 62.00, 67.00, 72.00 and former, wing-fold fitting between stations B L-57.00 and 72.00. Stations as shown AN01-245-FBC-3, Fig. 2-2.

Cause of Occurrence: Restrictor Part No. 30-100-048 was found to be installed in the *down line* (wing spread) *vice up line* (wing fold) to the starboard actuating cylinder Part No. 23-96-045-1. Wing-fold electrical actuating switch Part No. AN 30-22-3 was wired in *reverse*.

Corrective Action: Retrace all hydraulic lines and electrical wiring, install restrictor in correct lines and make necessary repair to damaged area.

Reversed Lines

THE fuel and oil transmitter lines to the cockpit instruments were connected erroneously in that the fuel line was connected to the oil indicator and the oil line was connected to the fuel indicator.

The engine of the P5M-2 was being run to make post installation adjustments of new engine. The mounting gasket blew from the fuel pump, stock number R2915-474-3852-ZCH.A. A fire resulted.

D—Minor damage, starboard engine, inboard cowl flaps scorched (repairable), two cowl flap actuators burned (replaced), small amount of wiring and tubing replaced, repainted inboard side of nacelle and bomb-bay door.

The engine was received from a FASRon, ready for installation. After installation, turn up of the engine revealed the fuel pressure to be below desired. Due to faulty pressure transmissions, the cockpit indications were incorrect. An attempt to adjust the fuel pressure resulted in extreme high pressures at the pump which blew the mounting gasket. The resultant fuel leak caused a fire in the accessory section. After the fire broke out, the engine fire extinguisher was actuated. This action extinguished the fire satisfactorily.

There was no damage to government or private property other than the aircraft itself.

Reversed Switch Guard

A NAVIGATION pac containing certain electronics components for OMNI and MARKER BEACON was dropped by inadvertent operation of the center stores jettison switch during flight. The F4D-1 was flying straight and level at 41,000 feet and 240 knots indicated.

The pilot inadvertently jettisoned center stores by actuating jettison switch on left rear console. This switch was mistaken for COMPUTER OUT switch located on radar panel nearby. Examination of the switch revealed that the guard which is installed to prevent inadvertent operation, was installed improperly (guard was reversed) allowing the switch to be operated without first raising the guard.

Examination of other squadron aircraft revealed one other improper installation. These switches are permanently affixed to the console and were installed prior to delivery of the aircraft to this squadron.

The two switches that were found to be improperly installed have been properly re-installed and the attention of all pilots has been directed to the close proximity of the COMPUTER OUT switch and the jettison switch and to the necessity of being alert to prevent inadvertent operation of the jettison switch. •

Clipboard

Near Misses On Ground

A COLLISION of aircraft on the airport can produce the same gory mess as a collision at 20,000 feet! Recent incidents, involving aircraft of four separate airlines, point out that near misses are occurring on the ground as well as in the air.

One aircraft taxied onto a runway in front of a landing aircraft. Two aircraft took off simultaneously on intersecting runways. Analysis reveals contributing causes to be (1) not using airline name and complete trip number on *every* radio transmission, (2) not *"reading back"* restrictions to hold clear, and (3) not having radio volume control turned up sufficiently.—*ALPA Technical Talk for Pilots.*

No Compromise, Please

THERE often is strong temptation to alter, unilaterally, established procedures or techniques. Let's not compromise standard operating procedures and checklists! Procedures are the result of cumulative effort and there is no pride of authorship involved. If you feel there is a better way of doing something, talk it over with the boss of your operation. He should check it out and adopt your suggestion if, after a thorough evaluation, it is proved to be an improvement over present techniques. If he is the NIH * type, then you might use indiscretion (give him impression he thought of it first) but in the long run it is safer not to go off on tangents.—

*Not Invented Here—therefore, no good.

FSF Accident Prevention Bul. 58-5

Airport Obstacles

ALMOST overnight a tall TV tower can suddenly grow out of the ground at almost any place. Such towers are particularly ornery because they have a knack of "growing" right where or near where they should not, as far as pilots are concerned.

Keep current with respect to obstacles in the vicinity of airports through which you are flying. Check the latest information on the erection of TV and radio towers.

"Down" Sign

IT IS recommended that "downed" aircraft be identified by a red streamer fastened to the step of the aircraft and that no one work on aircraft so marked unless they are thoroughly familiar with the discrepancy and are fully qualified to work on the aircraft.—*from an accident investigation.*

Supervise

WHILE supervision offers the greatest field for aviation safety improvement, it cannot replace or substitute for the earnest desire and effort on the part of every man, from the commanding officer to the seaman, to do his job in the best way possible. This is the real basis for true flight safety. Given this ingredient, human errors are the remaining factor. *Supervision* helps to eliminate human errors that occur despite a person's best efforts.—*USCG Safety Letter*

Mule Train

WHEN shutting down operations for the night or for the week end, VAP-62 hooks up all available mules and towbars to aircraft in the hangar—aircraft that are in movable shape. In the event of fire or any other "get-'em-out-of-the-barn" panic, the aircraft are one step closer to being safely outside, fewer persons are endangered in hooking them up in a hurry, and (by-products) mules are not handily available for unauthorized use as personnel transports.

This has been done before, but VAP-62 is believed the first outfit to announce it publicly.

ANSWERS TO

WHIZ QUIZ, page 20

1. 24,000 ft. (CAR 60, Spec. Notices Sec of RADFACS).

2. Yes. Alternate required if destination weather below 5000 ft. ceiling or 5 mi. visibility or is forecast to fall below either within 2 hrs. after ETA. (OPNAV INSTR 3710.7A and 3720.2A).

3. c. Last 5 digits of BuNo must be utilized for initial call-up. Reduce to last 3 digits once communications is established. (OPNAV NOTICE 2390 of 19 May 1958).

4. True (OPNAV INST 3720.2A).

5. Total planned time from take-off to the radio fix at destination. This should also be the last place listed in the "ROUTE" portion of the DD 175. (OPNAV INST 3710.7A).

6. False. A pilot cancels IFR by notifying ATC. It is the pilot's responsibility to be VFR and to be able to remain so. (CAR Part 60) EXCEPTION: Pilots will not be permitted to cancel an IFR flight plan and remain in the positive controlled airspace.

LCDR ROBERT E. MORRIS, VAH-1

Aircraft: A3D

The right main wheel of LCDR Morris' A3D separated from the aircraft during FCLP. After examination of the gear by another aircraft, it was agreed that LCDR Morris' crew should bail out and that he would then attempt to set the *Skywarrior* down on two wheels and a stub.

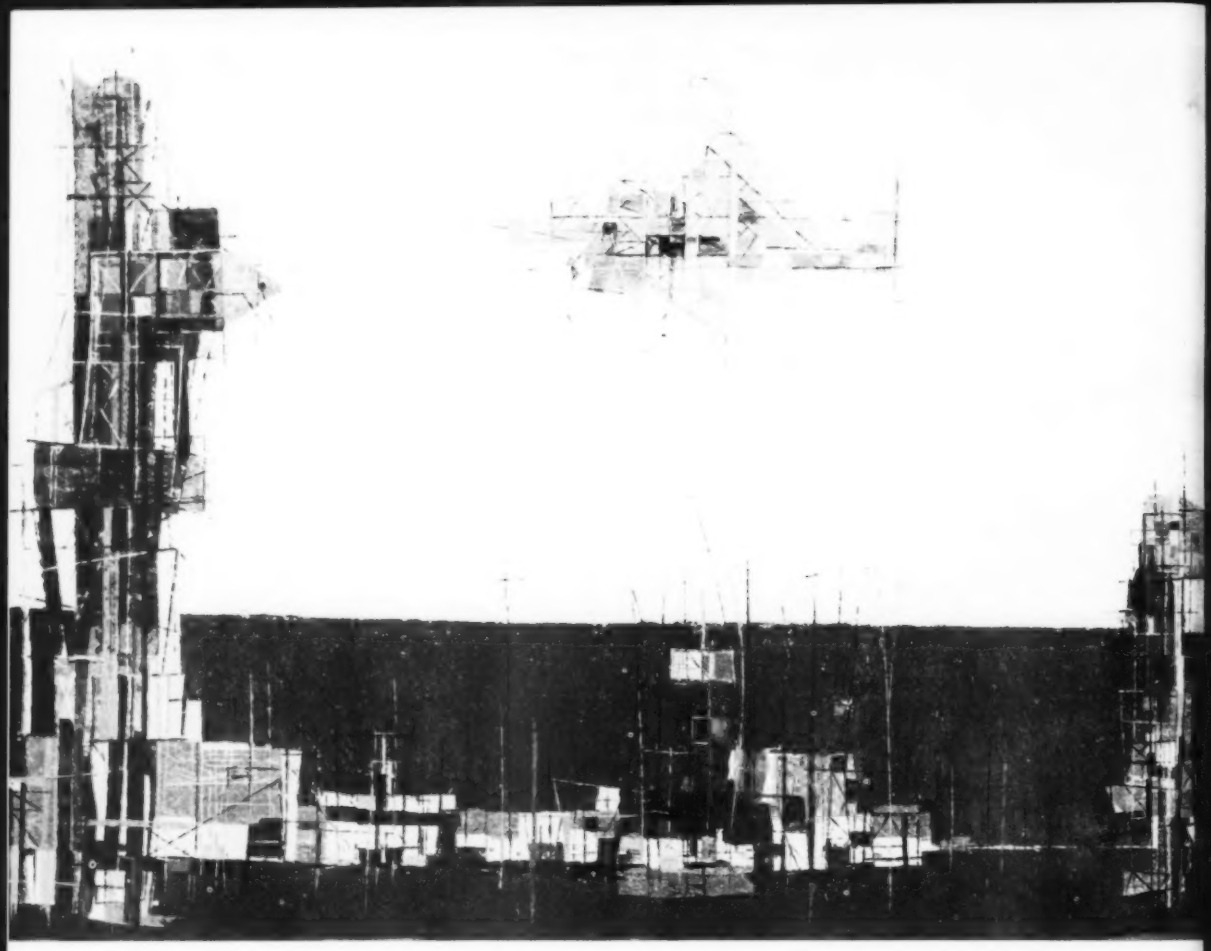
The runway was foamed and the arresting gear was rigged while LCDR Morris burned down to minimum weight. His crew had bailed out from 10,000 feet and were safely recovered.

LCDR Morris waved off on his first pass; on his second attempt a perfect touchdown and engagement was made, and the aircraft was arrested to a safe stop with damage limited only to the wheelless strut.

LCDR Morris' decision to land and save the A3D was made after careful consideration of the other alternatives—he could have bailed out at sea, or crash-landed into the arresting gear with all wheels retracted. His choice was deliberate and with due regard for the safety of other persons, himself, and the high likelihood of saving the Navy a valuable combat weapon. His handling of an unprecedented emergency situation and his skillful flying are tangible evidence of his eligibility for membership in the Old Pro Club. Congratulations, LCDR Morris!

OLD PRO

Recognition of heads-up flying is essential to a positive program of flight safety. For this reason *Approach* will acknowledge certain selected individuals whose exhibited flying ability merits membership in the "Old Pro Club" of naval aviators. Commanding Officers are invited to submit nominations for selection.



Painting courtesy of The Butler Institute of American

Most aviator folks would be reluctant to admit that they understand, much less appreciate, abstract art. If you got a sudden first impression that the painting above had something to do with aviation, communications, or some guiding link between the airborne aviator and the earthbound communicator, you must face up to the fact that you do dig the abstract, man.

"Ground Air Control," by Donald L. Weismann, symbolizes in many ways the aviator's dependence upon ground facilities. In fact, a quick glance at the structure on the left might almost remind one of that Everywhere Aviator, Anymouse, no?

Emanating from the many and varied antennas on the earth are ATC, GCI, ARTC, LF, MF, TACAN, and VOR.

There's also GCA, a system that keeps airfields open for business when seagulls mutter to themselve about not having a green card . . . . Abstract art appreciator or no, see "Request GCA" on page six, for some discussion on the techniques and philosophy of a piece of gear which has earned its reputation as the Pilot's Best Friend the world around . . .

merican